IT CORPORATION

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SECOND QUARTER MONITORING REPORT

APRIL TO JUNE 2001

KIN-BUC LANDFILL OPERABLE UNITS 1 AND 2

Prepared for

SCA Services, Inc.
Edison Township, Middlesex County, New Jersey

August 2001

Prepared by

EMCON/OWT
Crossroads Corporate Center
One International Boulevard, Suite 700
Mahwah, New Jersey 07495

OWT Project 791186

588957

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EXECUTIVE SUMMARY

The Kin-Buc Landfill Site is a closed 200-acre industrial/commercial landfill located in Edison, New Jersey, which the USEPA placed on the National Priorities List (NPL) in 1981. A Remedial Investigation/Feasibility Study (RI/FS) was conducted between 1983 and 1988 which resulted in a Record of Decision (ROD) by USEPA in 1990 that called for source control of Operable Unit 1 (OU1).

The remedial action specified in the ROD for OU1 included the construction of a slurry wall around OU1, the collection and treatment of leachate and groundwater from within the containment area, and the capping of the area within the slurry wall. Remedial construction activities for OU1 were completed by the end of August 1995.

In accordance with the RODs, hydraulic monitoring and landfill gas monitoring is conducted on a quarterly basis to evaluate the effectiveness of the remedial actions. This report documents the results of the monitoring activities for the Second Quarter of 2001.

Remedial Objectives

The general remedial objectives of the OU1 closure and collection systems are to contain source leachate and contaminated groundwater, and to prevent further migration of site-related contaminants. The primary objective of leachate collection system is to impose an inward gradient as measured across the slurry wall in the refuse unit. The primary objectives of the groundwater collection system is to prevent migration of contaminated groundwater towards the slurry wall and impose an upward gradient from the bedrock unit to the sand & gravel unit.

Hydraulic Control and Monitoring System

The hydraulic control system for OU1 consists of leachate and groundwater collection systems. The leachate collection system consists of a perforated pipe that runs parallel to the inside of the perimeter slurry wall and 4 pump stations. The groundwater collection system consists of 4 pumping wells.

The hydraulic monitoring system for OU1 is located along the circumferential slurry wall with many of the wells located in 5 clusters, called transects. The hydraulic monitoring wells at the transects are installed in pairs, within the same hydrogeologic unit, with

1 well inside and 1 well outside the circumferential slurry wall. Twenty-four of the monitoring wells are continuously monitored using water level recorders.

Hydraulic monitoring network consists of wells screened in the refuse, sand & gravel, and bedrock units. Well designations of G, S, or R denote hydraulic units of refuse, sand & gravel or bedrock, respectively.

The OU2 hydraulic monitoring well network is located in the Low-Lying Area and Mound B, and monitors groundwater elevations outside of the OU1containment area.

Second Quarter Hydraulic Monitoring Activities

Manual groundwater elevation measurements were obtained and continuous water level data downloaded from the monitoring wells in OU1 and OU2 during site visits on April 26, May 16, June 7, June 12, and July 5, 2001. During the months of April and May, OU2 wells located near Mound B were not accessible due to construction activities on-site.

Hydraulic monitoring indicates that intragradient conditions in the refuse unit (lower water levels in the refuse inside the wall relative to water levels outside the wall) were maintained at all of the TL throughout the quarter. Intragradient conditions in the sand & gravel unit (lower water levels in the sand & gravel unit inside the slurry wall relative to water levels outside the wall) were maintained at TL's Nos. 3 and 4 throughout the quarter. The average flow condition at TL No. 2 was intragradient throughout the quarter, although there were periods where intragradient conditions were not observed. On average, upward gradient conditions between the bedrock and the overlying sand & gravel deposits were observed at the TLs inside of the slurry wall throughout the quarter with the exception of TL No. 2.

The synoptic groundwater elevations obtained during the Second Quarter of 2001 indicate both upward and downward hydraulic gradients between the different geologic strata.

Leachate Withdrawal/Groundwater Pumping

Groundwater was collected from S&G Wells 1, 2, 3, and 4 at an average rate for the quarter of 12,249 gpd. The total volume of groundwater collected for the quarter was 1,114,603 gallons. Leachate was collected at an average daily rate of 1,112 gpd for the quarter, and the total volume of leachate collected was 101,165 gallons. Both groundwater and leachate collection were generally consistent with recommended withdrawal rates.

Landfill Gas Monitoring

Combustible gas was not detected in any of the 6 gas monitoring wells located on the north side of OU1. Based on the non-detection of combustible gas in the monitoring wells, the active gas collection system is functioning properly and there is no apparent off-site gas migration. Monitoring at the flare inlet port revealed that the landfill gas collection system was delivering 49.2 percent combustible gas to the flare.

1 INTRODUCTION

The Kin-Buc Landfill Site is a closed 200-acre industrial/commercial landfill located in Edison, New Jersey, which operated under a New Jersey Department of Environmental Protection (NJDEP) permit until 1976. The USEPA placed the Kin-Buc Landfill on the National Priorities List (NPL) in 1981. Between 1983 and 1988, the Respondents conducted a Remedial Investigation/Feasibility Study (RI/FS) which resulted in a Record of Decision (ROD) by USEPA in 1990 which called for source control of Operable Unit 1 (OU1), and an additional RI/FS to determine the nature and extent of contamination outside the source area, thus defining Operable Unit 2 (OU2).

Operable Unit 1 includes both Kin-Buc I and II Mounds, the former Pool C Area and a portion of the Low-Lying Area between Kin-Buc I and the Edison Landfill. The remedial action specified in the ROD for OU1 included the construction of a slurry wall around OU1, the collection and treatment of leachate and groundwater from within the containment area, and the capping of the area within the slurry wall.

Operable Unit 2 includes Mound B, Edmonds Creek and adjacent wetlands, the remaining Low-Lying Area between OU1 and the Edison Landfill, Martins Creek, and the Raritan River. The OU2 ROD called for the excavation and disposal of PCB-contaminated sediments from within the Edmonds Creek Marsh Area, the restoration of disturbed wetland areas, and groundwater/surface water monitoring.

Remedial construction activities for both OU1 and OU2 were completed by the end of August 1995.

In accordance with the RODs, hydraulic monitoring and landfill gas monitoring is conducted quarterly to evaluate the effectiveness of the remedial actions. This report documents the results of the monitoring activities for the Second Quarter of 2001.

2 DESCRIPTION OF MONITORING PROGRAM

2.1 Hydrogeologic background

The primary hydrogeologic units within OU1, from ground surface downward, are refuse, meadow mat, sand & gravel, and bedrock. Near the northern portion of the site the bedrock is closer to the surface and there is no sand & gravel unit in that area.

The southern portion of the site is located in close proximity to the Rartin River. As a result, monitoring wells located on the southern side of OU1 are impacted by tide fluctuations.

2.2 Remedial Objectives

The general remedial objectives of the OU1 closure and collection systems are to contain source leachate and contaminated groundwater, and to prevent further migration of site-related contaminants. The specific remedial objectives for the leachate collection, groundwater collection, and hydraulic monitoring are summarized as follows:

Aqueous Leachate Collection

- Primary
  - Collect leachate from the refuse unit within the perimeter slurry wall to impose an inward gradient as measured across the slurry wall (hydraulic containment).
- Additional Benefit
  - Reduce the downward gradient between the refuse unit and the underlying sand & gravel or bedrock units.

Sand & Gravel Groundwater Collection (in Primary OU1 Containment)

- Primary
  - Prevent migration of contaminated groundwater towards the slurry wall.
  - Impose an upward gradient from the bedrock unit to the sand & gravel unit (hydraulic containment).
- Additional Benefit
  - Impose an inward gradient within the sand & gravel unit as measured across the perimeter slurry wall (hydraulic containment).

Sand & Gravel Aquifer Groundwater Collection (in Oil Seeps Area Containment)

- Collect sand & gravel groundwater from within the Oil Seeps Area if an upward gradient between the sand & gravel and the refuse units cannot be imposed by leachate collection alone.

2.3 Hydraulic Control and Monitoring System

The hydraulic control system for OU1 consists of 4 leachate pump stations, and 4 sand & gravel groundwater pumping wells. The leachate collection system consists of a perforated pipe that runs parallel to the inside of the perimeter slurry wall. In addition, a corrugated oily leachate collection conduit is located along the south side of Kin-Buc I mound. The layout of the collection system is shown on Drawing 1.

The hydraulic monitoring system for Operable Unit 1 is located along the circumferential slurry wall with many of the wells located in 5 clusters, called transects. The OU1 hydraulic monitoring well network consists of 11 wells screened in the refuse/fill, 8 wells screened in the sand & gravel, and 10 wells screened within bedrock A summary of the well network is provided in Table 2-1, and the well locations are shown in Drawing 1.

The hydraulic monitoring wells at the transects are installed in pairs, within the same hydrogeologic unit, with 1 well inside and 1 well outside the circumferential slurry wall. The design of the well network allows groundwater elevations to be monitored on either side of the slurry wall and provides data to evaluate the performance of the slurry wall as a hydraulic barrier.

At transect locations (TLs) 2, 3 and 4, the hydraulic monitoring wells are installed in the refuse, sand & gravel and bedrock units. At Transect Locations 1 and 5, the hydraulic monitoring wells are installed only in the refuse and bedrock units due to the absence of sand and gravel deposits in these areas. Wells designations of G, S, and R denote hydraulic units of refuse, sand & gravel and bedrock, respectively

The OU2 hydraulic monitoring well network is located in the Low-Lying Area and Mound B, and monitors groundwater elevations outside of the OU1containment area. The hydraulic monitoring system for OU2 consists of 16 wells, as indicated in Table 2-2 and as shown on Figure 2-1. Water elevation measurements from the OU2 wells are taken manually, concurrent with the OU1 monitoring activities.

2.4 Second Quarter Hydraulic Monitoring Activities

Monitoring and sampling for the Second Quarter of 2001 (April to June) took place according to the procedures and methods outlined in the Draft Operations and Maintenance (O&M) Manual for the Kin-Buc Landfill, prepared on behalf of the Respondents by Wheelabrator EOS in September 1995 and modified by letter to EPA dated February 28, 1996. The modified hydraulic monitoring program will be approved by the USEPA upon final approval of the Draft O&M Manual.

Components of the hydraulic monitoring program consist of continuous and manual water level measurements. Manual measurements were obtained with an electronic water level indicator. Continuous water levels were obtained at 1-hour intervals using 24 In-Situ "Trolls", Model SP4000 data logger and transducer.

Manual groundwater elevation measurements were obtained from the monitoring wells in OU1 and OU2 during site visits on April 26, May 16, June 7, June 12, and July 5, 2001. The manually recorded water level monitoring results are provided on Table 2-3.

Three months of continuous water level data have been obtained from the refuse and sand & gravel wells at the site from April 1, 2001 to June 30, 2001. The minimum and maximum recorded water elevations for each month in the quarter are provided in Table 2-4. Continuous groundwater elevation graphs organized by transect location and hydrogeologic unit are provided in Appendix A. Evaluations of the recorded data are performed on a monthly basis. Copies of these monthly evaluations are provided in Appendix B.

2.5 Continuous Hydraulic Monitoring Results vs. Manual Elevation Measurements

The continuous water level monitoring information collected by the Trolls was compared with the data collected from the 3 manual recordings to provide information on the relative accuracy of manual versus automatic recordings. Table 2-5 shows the difference between the 3 manual water level elevation measurements and Troll recordings for the same day and hour. Differences between the manual and continuous measurements were below 0.3 feet for all wells except W-2G and W-15G, which were at 0.38 and –0.35, respectively. Based on the comparison above, the data recorded by the Trolls is satisfactory and reflects accurate groundwater elevations.

3 HYDRAULIC MONITORING

A summary of the Second Quarter hydraulic profile is provided in figure 3-1. Intragradient conditions in the refuse unit (lower water levels in the refuse inside the wall relative to water levels outside the wall) were maintained at all of the TL throughout the quarter. Intragradient conditions in the sand & gravel unit (lower water levels in the sand & gravel unit inside the slurry wall relative to water levels outside the wall) were maintained at TL Nos. 3 and 4 throughout the quarter. The average flow condition at TL No. 2 was intragradient throughout the quarter although there were intermittent periods where intragradient conditions were not maintaned. On average, upward gradient conditions between the bedrock and the overlying sand & gravel deposits were generally maintained at the TLs inside of the slurry wall throughout the quarter. The detailed analysis of the hydraulic conditions at each transect in the various hydrogeologic units is provided below.

3.1 Assessment of Hydraulic Conditions in the Refuse Unit

Hydrographs 1 through 5 located in Appendix A show the continuous water levels in the refuse wells at TL Nos. 1 through 5. The heavier weight line denotes wells located outside the slurry wall. A straight line on the hydrograph signifies that the water levels were below the range on the Troll. The hydrographs show that intragraident conditions (lower water levels in the refuse inside the wall relative to water levels outside the wall) were maintained at all of the TL throughout the quarter. A detailed analysis of each of the TL is provided below.

TL No. 1 (W-1G/W-2G)

Troll measurements indicate that intragradient conditions were maintained in the refuse unit throughout the quarter at TL No. 1. The average water elevation for the quarter for Well 1G and 2G was 11.52 and 13.22 feet msl, respectively. The average water level difference was 1.70 feet in an inward direction.

TL No. 2 (W-3G/W-4G)

Intragradient conditions were maintained at TL No. 2 in the refuse unit throughout the quarter. The average quarterly water elevation for Wells 3G (inside) and 4G (outside) was 10.67 and 11.24 feet msl, respectively. The difference in the average head elevations between the two wells was approximately 0.57 feet in an inward direction.

TL No. 3 (W-5G/W-6G)

Based on the Troll data collected, intragradient conditions were maintained at TL No. 3 in the refuse unit throughout the quarter. The average quarterly water elevation for Wells 5G (inside) and 6G (outside) was 10.71 and 13.21 feet msl, respectively. The head elevation difference between the two wells was approximately 2.5 feet in an inward direction.

TL No. 4 (W-15G/W-13G) Oil Seeps Area

Intragradient conditions were maintained across the extended slurry wall around the Oil Seeps Area in the refuse unit throughout the quarter. The average quarterly water elevation for Wells 15G (inside) and 13G (outside) was 0.47 and 6.69 feet msl, respectively. The average head elevation difference between the two wells was approximately 6.22 feet in an inward direction.

TL No. 5 (W-9G/W-10G)

Intragradient conditions were maintained at TL No. 5 in the refuse unit throughout the quarter. The average quarterly water elevation for Wells 9G (inside) and 10G (outside) was 7.56 and 8.38 feet msl, respectively. The average head elevation difference between the two wells was approximately 0.82 feet in an inward direction.

3.2 Assessment of Hydraulic Conditions in the Sand & Gravel Unit

Hydrographs 6 through 9 located in Appendix A show the continuous water levels in the sand & gravel wells at TL Nos. 2 through 4. The water levels in the wells on the outside of the slurry wall vary significantly over the course of the day due to the tidal influence at the site. For clarity, Hydrographs 6 through 9 show the average water level in the well over a 24-hour period (12 hours before and 12 hour after). The heavier weight line on the hydrograph denotes wells located outside the slurry wall.

TL No. 2 (W-3S/W-4S)

Intragradient conditions were evident throughout the quarter, although there were periods where such conditions were not maintained. The average quarterly water elevation for Wells 3S (inside) and 4S (outside) was 1.20 and 1.35 feet msl, respectively.

TL No. 3 (W-5S/W-6S)

Intragradient conditions were maintained at TL No. 3 in the sand & gravel unit throughout the quarter. The average quarterly water elevation for Wells 5S (inside) and 6S (outside) was 1.55 and 1.88 feet msl, respectively. The head elevation difference between the two wells was approximately 0.33 feet in an inward direction.

TL No. 4 (W-7S/W-8S)

Intragradient conditions were maintained at TL No. 4 in the sand & gravel unit throughout the quarter. The average quarterly water elevation for Wells 7S (inside) and 8S (outside) was 1.96 and 2.49 feet msl, respectively. The head elevation difference between the two wells was approximately 0.53 feet in an inward direction.

TL No. 4 (W-15S/W-13S) Oil Seeps Area

Due to an upward gradient between the sand & gravel and refuse units in the oil seeps area, groundwater was not collected from the sand & gravel unit. Hydrograph 9 shows the ambient conditions between Wells W-15S (outside) and W-13S (inside) in the sand & gravel unit.

3.3 Assessment of Vertical Hydraulic Gradients

Hydrographs 10 through 15 located in Appendix A, show the continuous water levels in the sand & gravel and bedrock wells at TL Nos. 2 through 4. The water levels in the bedrock wells vary significantly over the course of the day due to the tidal influence at the site. For clarity, the hydrographs show the average water level in the well over a 24-hour period (12 hours before and 12 hours after). The heavier weight line on the hydrograph denotes wells located in the bedrock unit.

On average, upward gradient conditions between the bedrock and the overlying sand & gravel deposits were often observed at all of the TL throughout the quarter with the exception of TL No. 2 and TL No. 3 on the outside of the slurry wall. A detailed analysis of each of the TL is provided below.

TL No. 2 (W-3S/W-3RR) – Inside; (W-4S/W-4R) - Outside

The average gradient conditions were often in an upward direction between the bedrock and overlying sand & gravel units inside the slurry wall at TL No. 2 throughout the quarter. The average quarterly water elevation for Wells 3S (sand & gravel) and 3RR (bedrock) was 1.20 and 1.25 feet msl, respectively.

Outside the slurry wall at TL No. 2, the vertical gradient between the bedrock and overlying sand & gravel units was in a downward direction. The average quarterly water elevation for Wells 4S (sand & gravel) and 4R (bedrock) was 1.35 and 1.04 feet msl, respectively.

TL No. 3 (W-5S/W-5R) – Inside; (W-6S/W-6R) - Outside

Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units inside the slurry wall at TL No. 3 throughout the quarter. The average quarterly water elevation for Wells 5S (sand & gravel) and 5R (bedrock) was 1.55 and 1.75 feet msl, respectively.

Outside the slurry wall at TL No. 3, upward gradient conditions were not observed between the bedrock and overlying sand & gravel units. The average quarterly water elevation for Wells 6S (sand & gravel) and 6R (bedrock) was 1.88 and 1.87 feet msl, respectively.

TL No. 4 (W-7S/W-7R) – Inside; (W-8S/W-8RR) -Outside

Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units inside the slurry wall at TL No. 4 throughout the quarter. The average quarterly water elevation for Wells 7S (sand & gravel) and 7R (bedrock) was 1.96 and 2.14 feet msl, respectively.

Outside the slurry wall at TL No. 4, upward gradient conditions were observed between the bedrock and overlying sand & gravel units. The average quarterly water elevation for Wells 8S (sand & gravel) and 8RR (bedrock) was 2.49 and 2.66 feet msl, respectively.

Hydrograph 9 also contains the continuous water level elevations for Well W-15G in the refuse unit. Upward gradient conditions were maintained across the meadow mat between the sand & gravel and refuse units in the Oil Seeps Area throughout the quarter. The average quarterly water elevation for Wells 15S (sand & gravel unit) and 15G (refuse unit) was 2.44 and 0.47 feet msl, respectively. The average head elevation difference between the two wells was approximately 1.97 feet in an upward direction.

3.4 OU2 Hydraulic Monitoring

The synoptic groundwater elevations obtained during the Second Quarter of 2001 indicate both upward and downward hydraulic gradients. Groundwater elevations were not collected on April 26 and May 16 from monitoring wells near the Mound B area due to ongoing construction activities.

Downward hydraulic gradients prevail between the refuse and the underlying sand & gravel. Downward hydraulic gradients were only noted between the overlying sand &

gravel and bedrock units at WE-3S/WE-3R on May 16 and June 12; and GEI-6S/WE-6R on June 12.

4 LEACHATE WITHDRAWAL/GROUNDWATER PUMPING

The performance of the site hydraulic controls is largely dependent upon groundwater pumping and leachate withdrawal rates. The design aqueous leachate and groundwater (GW) collection rates called for a ratio of 3:1, groundwater to leachate of 30,000 gpd groundwater, and 10,000 gpd leachate. The collection rates differed from the design rates due to variations between design assumptions and actual site conditions. Collection rates are also adjusted based on changing site and operational conditions.

A groundwater pumping well performance evaluation was conducted in January and February of 2000 to evaluate the performance of the groundwater collection system in the sand and gravel. According to the Groundwater Pumping Well Performance Evaluation Report, prepared by IT Corporation in September 2000, hydraulic control of OU1 can be achieved by pumping S&G-2 and S&G-3 at a combined rate ranging from 10,000 to 15,000 gpd, with S&G-2 pumped at twice the flow rate of S&G-3. Based on the above recommendation, S&G-2 should be pumped at 10,000 gpd and S&G-3 pumped at 5,000 gpd. The long-term extraction rates could be reduced over time to 10,000 gpd or even lower based on the hydraulic monitoring data.

Leachate collection rates should maintain a leachate level low enough to achieve intragradient conditions and high enough to allow for the collection of oil. Based on the operational history, leachate collection rates of 500 to 1,500 gpd are sufficient to maintain intragradient conditions.

Operation records are maintained at the site and contain estimated daily averages for leachate and groundwater withdrawal. The monthly volumes collected and the daily average collection rate are provided below:

Monitoring Period	Groundwater S&G #1	Groundwater S&G #2	Groundwater S&G #3	Groundwater S&G #4	Leachate
April	59,290 gal.	219,054 gal.	55,001 gal.	0 gal.	34,431 gal.
	1,976 gpd	7,302 gpd	11833 gpd	0 gpd	1,148 gpd
May	97,570 gal.	322,886 gal.	33,145 gal.	10,752 gal.	45,661 gal.
	3,147 gpd	10,416 gpd	1069 gpd	347 gpd	1,473 gpd
June	29,137 gal.	212,437 gal.	62,465 gal.	12,866 gal.	21,073 gal.
	971 gpd	7,081 gpd	2,082 gpd	429 gpd	702 gpd
Quarter	**185,997 gal.**	**754,377 gal.**	**150,611 gal.**	**23,618 gal.**	**101,165 gal.**
	2,044 gpd	**8,290 gpd**	**1,655 gpd**	**260 gpd**	**1,112 gpd**

The volume of groundwater collected in the second quarter is 1,114,603 gallons, and the average daily groundwater withdrawal rate is 12,249 gpd. Groundwater collection rates are generally consistent with recommended extraction rates. Leachate collection rates are also within the recommended extraction rates.

5 LANDFILL GAS MIGRATION MONITORING

Landfill gas migration monitoring was performed at the operational flare port inlet and the 6 gas migration monitoring wells located along the northern edge of the landfill boundary.

5.1 Landfill Gas Migration

The purpose of the gas migration monitoring program is to monitor for off-site gas migration in those areas where gas migration or accumulation could lead to explosive conditions. Six gas migration monitoring wells are located outside of the circumferential slurry wall along the northern edge of the landfill boundary. The well locations are depicted on Drawing 1 and are spaced in 200-foot increments.

All areas of OU1 exterior to the slurry wall contain waste materials except along the northern edge of the landfill boundary. High levels of gas are not expected to be detected along the northern boundary because the slurry wall will act as an effective barrier, and the presence of an active gas extraction system and the high water table will inhibit gas migration.

Gas monitoring in other areas of the site containing waste materials will likely reveal combustible gas. However, since no on-site OU1 buildings are present (except the leachate treatment facility, which has its own engineered gas monitoring and control system), gas migration monitoring in the waste areas is not required by the O&M manual.

5.2 Gas Monitoring Well Results

Measurements of percent combustible gas (% GAS) and percent lower explosive limit (% LEL) were performed in the 6 gas migration monitoring wells along the northern boundary of the site on April 26, 2001. The wells were monitored in accordance with Attachment 1, Section 3.0 Routine Operations and Maintenance, of the Kin-Buc Landfill Draft O&M Manual (Wheelabrator, 1995). A Landtec GEM 500 sampling device was used to measure the concentration of combustible gas at each well by attaching the meter's sample tubing to the well head petcock and drawing the sample through the meter. Detectable levels of percent combustible gas and percent lower explosive limit were not observed in any gas monitoring wells. The results of the 6 gas migration monitoring wells are shown in Table 5-1.

5.3 Operational Flare Monitoring Results

The percent combustible gas by volume (% methane) at the landfill's operational flare port inlet was recorded throughout the second quarter of 2001. All readings were collected with a Landtec GEM 500 Gas Analyzer, equipped with a charcoal filter. Monitoring performed on April 26, 2001, revealed combustible gas at 49.2 percent at the flare port inlet.

The following summarizes the flare station operation during the Second Quarter of 2001:

Date	Gas Flow (SCFM)	Methane % by volume
4/9/01	128	48.8
4/19/01	114	37.1
5/7/01	128	43.1
5/21/01	120	43.0
6/4/01	104	51.0
5/18/01	96	46.8
Averages for Fourth Quarter	115	45.0

Note: Flare station data provided by Landfill personal.

6 CONCLUSIONS

Significant conclusions for the second quarter of 2001 monitoring program are as follows:

- In the refuse unit, intragradient conditions were maintained over the entire quarter at all of the TLs.

- Intragradient conditions in the refuse unit over the quarter were maintained with an average daily leachate extraction rate of 1,112 gpd.

- In the sand and gravel, intragradient conditions were maintained at TLs No. 3 and 4 over the entire quarter, although at TL No. 2. there were periods where intragradient conditions were not maintained. However, the average of water levels over the quarter was intragradient.

- An upward gradient across the meadow mat (between the sand & gravel and refuse units) was imposed at TL No. 4 in the Oil Seeps Area by leachate collection; therefore, intragradient conditions do not need to be maintained in the sand & gravel unit.

- Upward hydraulic gradients were observed at TL No. 3 inside the slurry wall and at TL No. 4 both inside and outside the slurry wall. At TL No. 2 inside the slurry wall there were intermittent periods where upward gradient conditions were not observed. At TL Nos. 2 and 3 outside the slurry wall, upward conditions were not observed.

- The volume and rate of groundwater collection was consistent with recommended levels. However, to optimize the hydraulic performance, S&G-2 should be pumped at twice the flow rate of S&G-3.

- Combustible gas as a percent of total gas and the lower explosive limit was not detected in the 6 monitoring wells located on the northern boundary of the site. The flare was operational and the percent methane at the flare port inlet was 49.2 percent. Based on the non-detection of combustible gas in the monitoring wells, the active gas collection system is functioning properly and there is no off-site gas migration.

REFERENCES

Proposed Groundwater Monitoring Plan for the Kin-Buc Landfill Operable Unit 1 RD/RA, Wehran Engineering Corporation, Middletown, New York, December 1992.

Final Addendum 1 to the Proposed Groundwater Monitoring Plan for the Kin-Buc Landfill Operable Unit 1 Closure Plan Re: OU2 Groundwater and Surface Water Monitoring, Wehran Engineering Corporation, Middletown, New York, August 1994.

Draft Operations and Maintenance Manual for the Kin-Buc Landfill, Wheelabrator EOS, Inc., Pittsburgh, PA, August 1995.

Remedial Action Report for Operable Unit 2 for the Kin-Buc Landfill Superfund Site, Blasland, Bouck & Lee, Inc., January 1996.

Appendix C Groundwater, Surface Water, Wetlands and Biota Monitoring Plans for the Kin-Buc Landfill Operable Units 1 and 2, Wheelabrator EOS, Inc., Pittsburgh, PA, August 1995.

Remedial Action Report Volume I Remedial Action Report, Tables, Appendices A1-A5 for the Kin-Buc Landfill Operable Unit 1, Blasland, Bouck & Lee, Inc., September 1995, Revised February 1996.

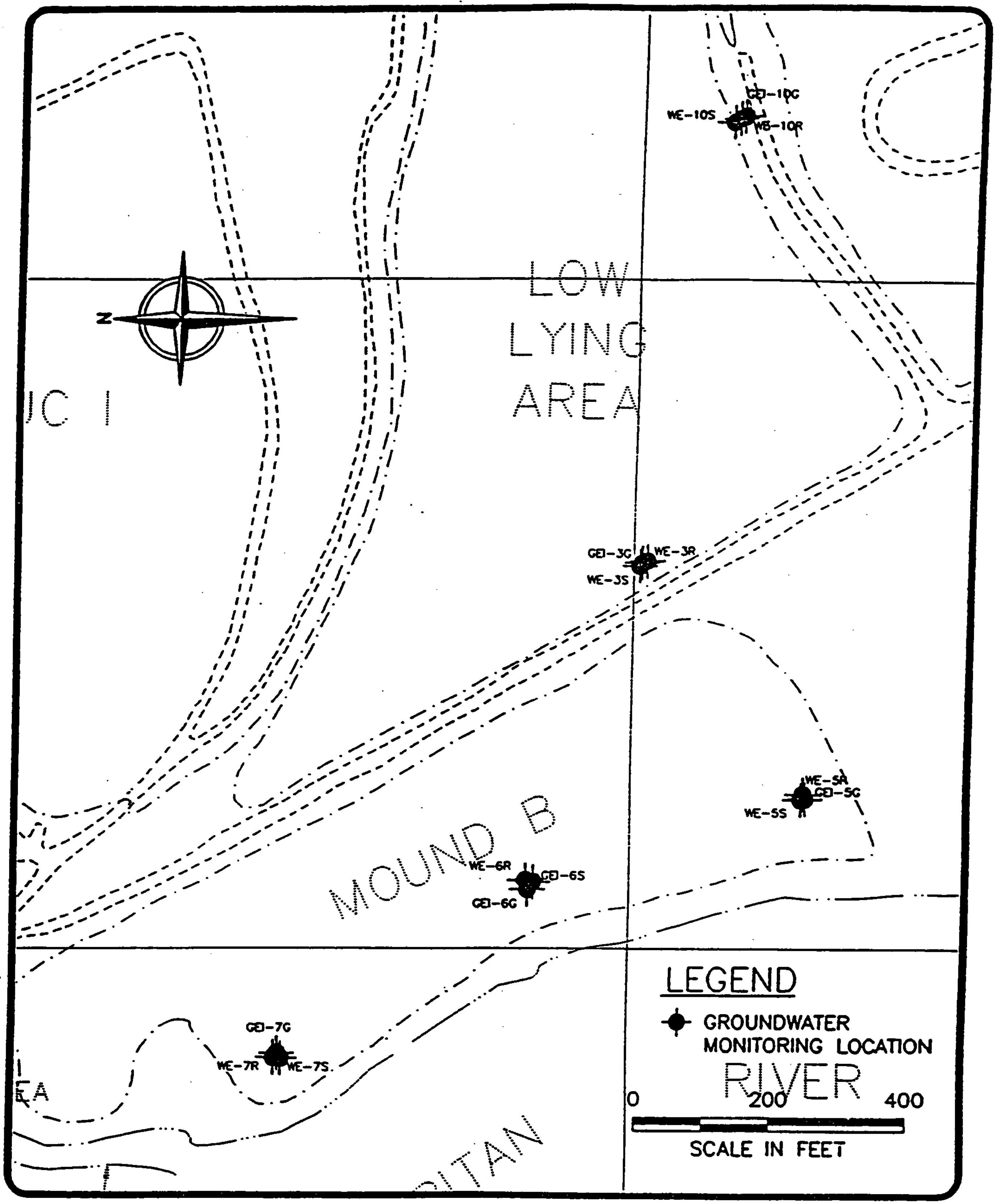
Draft Remedial Investigation Report for Kin-Buc Landfill Operable Unit 2, Wehran Engineering Corporation, Middletown, New York, October 1990.

Influent Equalization Logs, (Wheelabrator), Inc., Kin-Buc Landfill Treatment Plant, January 1997, February 1997, March 1997.

Kin-Buc Landfill Leachate Treatment Plant Operation and Site Post-Closure Care, Monthly Reports, Wheelabrator EOS, April, May, June 1997.

Groundwater Pumping Well Performance Evaluation Report, IT Corporation, July 2000.

Figure



EMCON

DATE

DWN DBT

APP RB

REV

KINBUC LANDFILL

EDISON TOWNSHIP, NEW JERSEY

OU2 GROUNDWATER MONITORING LOCATIONS

FIGURE

1-1

PROJECT NO.
12568-001.000

ene-mtown2/data: F:\DWG\12568001\MAKBF-01.dwg Xrefs: 8X11P, MAKBWE01, MAKBTW01, MAKBBD01
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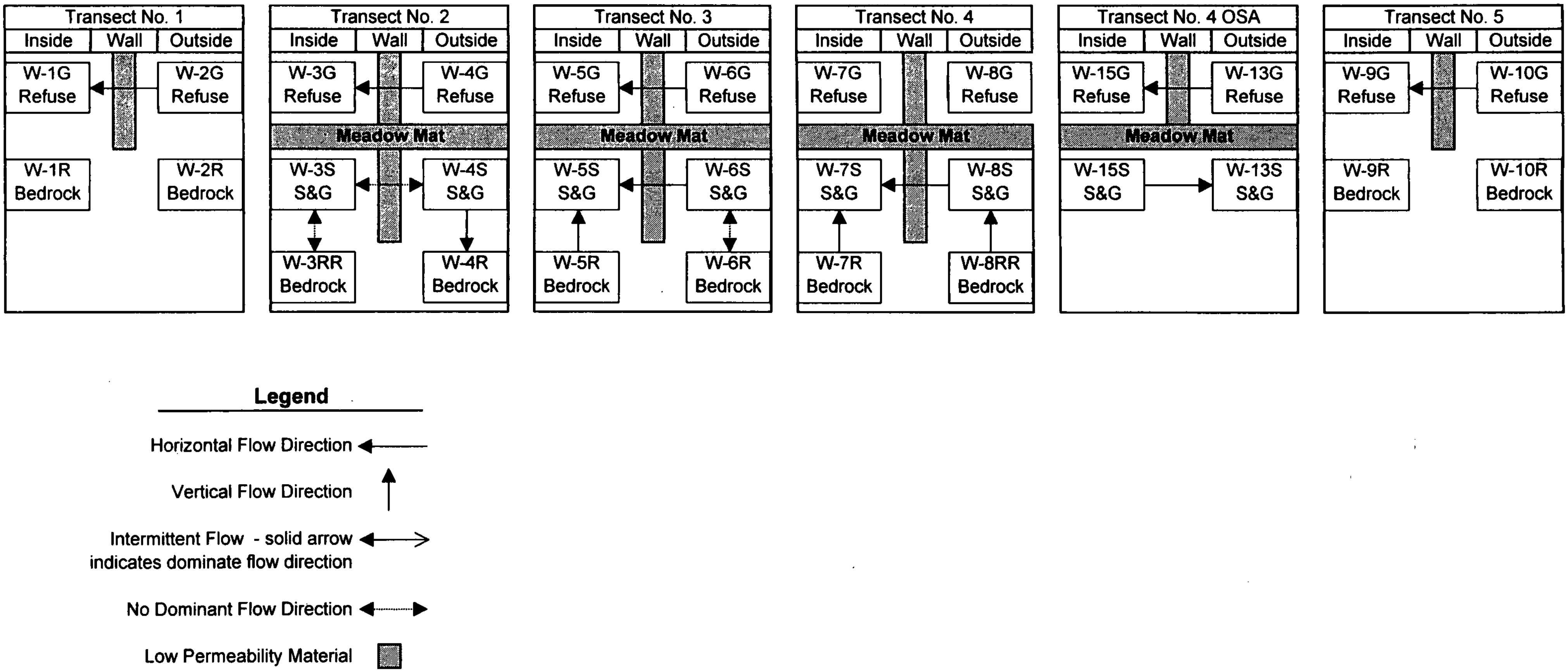
Figure 3-1
Kin-Buc Landfill
Second Quarter Hydraulic Profile Summary



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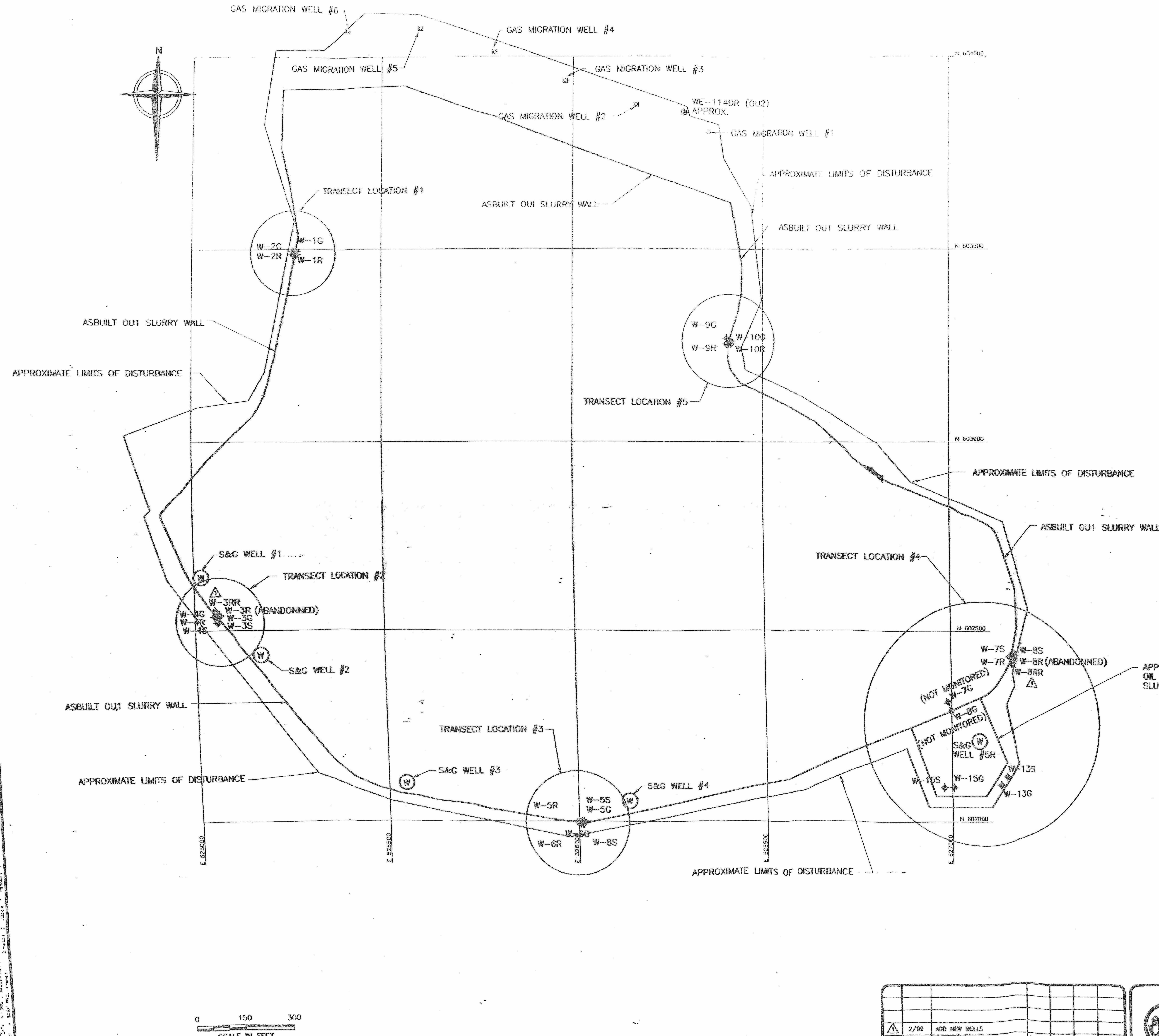
Drawing



LEGEND

- NEW MONITORING WELLS
- (W) NEW SAND & GRAVEL PUMPING WELLS
- NEW GAS MIGRATION WELLS
- OU2 UPGRADIENT MONITORING BEDROCK WELL (APPROXIMATE LOCATION)

SOURCE: BASEMAP DATA TAKEN FROM PLAN SHEET 10A OF MAP ENTITLED "KINBUC LANDFILL FINAL WELL LOCATION PLAN" PREPARED BY CONTI ENVIRONMENTAL INC. DATED JULY 17, 1995.

NOTES:
1. THE MONITORING WELL LOCATIONS W-7G, W-8G, W-13G, W-13S, W-15G, AND W-15S ARE APPROXIMATE.
2. MONITORING WELL W-8R IS DAMAGED AND NOT SERVICABLE AS A WATER QUALITY MONITORING POINT.
3. MONITORING WELLS W-7G AND W-8G REPLACED BY W-15G AND W-13G.
4. MONITORING WELLS W-8R AND W-3R ABANDONED AND REPLACED BY NEW MONITORING WELLS W-8RR AND W-3RR RESPECTIVELY.

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
1	2/99	ADD NEW WELLS				

DATE OF ISSUE 5/96 DWN BY SDT DES BY RB CHK BY APP BY

EMCON

KIN-BUC LANDFILL
EXISTING GROUNDWATER MONITORING PLAN
EDISON TOWNSHIP, NEW JERSEY

OPERABLE UNIT 1 MONITORING NETWORK

DRAWING NO. 1

TABLES

Table 2-1

Kin-Buc Landfill
Operable Unit 1
Continuous Hydraulic Monitoring Well Network/Transects

Transect Location No.	Screened Hydrogeologic Unit	Well Location Inside Slurry Wall	Well Location Outside Slurry Wall
1	Refuse/Fill	W-1G	W-2G
2	Refuse/Fill	W-3G	W-4G
	Sand and Gravel	W-3S	W-4S
	Bedrock	W-3RR	W-4R
3	Refuse/Fill	W-5G	W-6G
	Sand and Gravel	W-5S	W-6S
	Bedrock	W-5R	W-6R
4	Refuse/Fill(1)	W-15G	W-13G
	Sand and Gravel(1)	W-15S	W-13S
	Sand and Gravel(2)	W-7S	W-8S
	Bedrock (2)	W-7R	W-8RR
5	Refuse/Fill	W-9G	W-10G

Notes: (1) Wells located across the extended slurry wall.
(2) Wells located across the OU1 circumferential slurry wall.

Table 2-2

Kin-Buc Landfill
Operable Unit 2
Hydraulic Monitoring Network

Well Location	Screened Hydrogeologic Unit
Low-Lying Area	
GEI-10G	Fill/Refuse
WE-10S	Sand & Gravel
WE-10R	Bedrock
GEI-3G	Fill/Refuse
WE-3S	Sand & Gravel
WE-3R	Bedrock
Mound B	
GEI-5G	Fill/Refuse
WE-5S	Sand & Gravel
WE-5R	Bedrock
GEI-6G	Fill/Refuse
GEI-6S	Sand & Gravel
WE-6R	Bedrock
GEI-7G	Fill/Refuse
WE-7S	Sand & Gravel
WE-7R	Bedrock
Upgradient	
WE-114DR	Bedrock

Table 2-3
KinBuc Landfill Operable Units 1 and 2
Modified Monitoring Program
Second Quarter 2001
Manually Recorded Water Level Elevations

Well ID	TOC Bottom	TOC Ref Elevation	April 26, 2001		May 16, 2001		June 7, 2001	
			TOC Static	Elevation	TOC Static	Elevation	TOC Static	Elevation
OU1								
W-1G	20.50	30.78	19.75	11.03	19.75	11.03	18.56	12.22
W-1R	35.34	30.79	21.04	9.75	20.88	9.91	19.79	11.00
W-2G	20.83	30.77	18.02	12.75	18.64	12.13	17.40	13.37
W-2R	35.33	30.64	23.97	6.67	23.89	6.75	23.41	7.23
W-3G (oil)	19.07	20.73	10.59	10.14	10.32	10.41	10.31	10.42
W-3G	19.07	20.73	11.14	9.59	10.87	9.86	10.73	10.00
W-3S	31.48	20.79	19.21	1.58	20.15	0.64	19.30	1.49
W-3RR	54.40	21.16	19.48	1.68	20.78	0.38	19.80	1.36
W-4G	17.57	20.23	8.98	11.25	9.18	11.05	9.08	11.15
W-4S	31.58	19.71	18.01	1.70	18.92	0.79	18.14	1.57
W-4R	54.92	20.61	18.87	1.74	19.97	0.64	19.04	1.57
W-5G	24.36	23.94	13.25	10.69	13.18	10.76	13.13	10.81
W-5S	30.33	24.33	22.51	1.82	22.51	1.82	22.37	1.96
W-5R	41.64	24.11	22.32	1.79	22.35	1.76	22.19	1.92
W-6G	23.99	23.69	10.71	12.98	11.04	12.65	10.40	13.29
W-6S	38.49	24.00	22.11	1.89	22.11	1.89	21.94	2.06
W-6R	50.43	23.99	22.11	1.88	22.06	1.93	21.95	2.04
W-7G	19.91	18.30	7.83	10.47	7.55	10.75	7.45	10.85
W-7S	29.34	11.61	9.62	1.99	9.53	2.08	9.40	2.21
W-7R	45.13	11.05	8.95	2.10	8.82	2.23	8.69	2.36
W-8S	28.86	10.92	8.15	2.77	8.71	2.21	8.01	2.91
W-8RR	41.60	9.51	6.79	2.72	7.30	2.21	6.61	2.90
W-9G	21.93	27.34	19.81	7.53	19.85	7.49	19.75	7.59
W-9R	39.05	27.68	21.34	6.34	21.06	6.62	21.03	6.65
W-10G	22.56	27.43	18.96	8.47	19.13	8.30	18.96	8.47
W-10R	34.01	27.43	19.54	7.89	19.51	7.92	18.14	9.29
W-13S	29.32	10.1	7.81	2.29	7.93	2.17	7.56	2.54
W-13G	10.30	10.17	3.63	6.54	3.87	6.30	3.57	6.60
W-15S	33.36	16.05	13.71	2.34	13.75	2.30	13.48	2.57
W-15G(1)	16.99	16.18	15.41	0.77	15.36	0.82	15.31	0.87
OU2							June 12, 2001	
GEI-10G	13.91	13.65	1.10	12.55	1.43	12.22	1.13	12.52
WE-10S	29.57	14.99	13.31	1.68	13.23	1.76	13.27	1.72
WE-10R	41.74	13.96	12.30	1.66	12.18	1.78	12.24	1.72
GEI-3G	13.54	16.73	4.04	12.69	4.51	12.22	3.95	12.78
WE-3S	25.67	15.12	13.56	1.56	13.81	1.31	13.82	1.30
WE-3R	46.51	14.99	13.35	1.64	13.78	1.21	14.14	0.85
GEI-5G	14.60	16.08	NA (2)	NA (2)	NA (2)	NA (2)	9.28	6.80
WE-5S	25.84	15.04	NA (2)	NA (2)	NA (2)	NA (2)	14.30	0.74
WE-5R	49.64	15.31	NA (2)	NA (2)	NA (2)	NA (2)	14.64	0.67
GEI-6G	14.97	19.76	NA (2)	NA (2)	NA (2)	NA (2)	11.65	8.11
GEI-6S	43.67	20.99	NA (2)	NA (2)	NA (2)	NA (2)	20.45	0.54
WE-6R	47.12	19.62	NA (2)	NA (2)	NA (2)	NA (2)	19.38	0.24
GEI-7G	13.74	17.23	NA (2)	NA (2)	NA (2)	NA (2)	Dry	<3.49
WE-7S	30.07	15.86	NA (2)	NA (2)	NA (2)	NA (2)	16.10	-0.24
WE-7R	72.88	15.93	NA (2)	NA (2)	NA (2)	NA (2)	15.41	0.52
WE-114DR	44.84	23.76	17.32	6.44	17.02	6.74	16.89	6.87

NOTES: (1) All level, reference, bottom measurements recorded to the top of PVC inner casing.
(2) Levels not recorded, wells were not accessible due to drum removal being conducted on Mound B.

Table 2-4
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

Inside Slurry Wall

Well ID	Monitoring Period	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-1G	April	11.09	11.23	11.17
	May	11.09	11.22	11.19
	June	11.09	12.82	12.25
	2nd Quarter	11.09	12.82	11.52
W-3G	April	10.23	10.97	10.71
	May	10.29	10.92	10.65
	June	10.44	10.93	10.64
	2nd Quarter	10.23	10.97	10.67
W-3S	April	-0.13	2.44	1.40
	May	-0.34	1.95	0.87
	June	0.36	2.22	1.34
	2nd Quarter	-0.34	2.44	1.20
W-5G	April	10.23	11.16	10.69
	May	10.27	11.12	10.69
	June	10.48	11.14	10.74
	2nd Quarter	10.23	11.16	10.71
W-5S	April	0.97	2.33	1.65
	May	0.97	1.94	1.45
	June	1.03	2.16	1.56
	2nd Quarter	0.97	2.33	1.55
W-7S	April	1.58	2.79	2.16
	May	1.44	2.36	1.93
	June	1.36	2.51	1.81
	2nd Quarter	1.44	2.79	1.96
W-15S	April	2.00	3.28	2.50
	May	1.99	2.99	2.39
	June	2.05	3.09	2.44
	2nd Quarter	1.99	3.28	2.44
W-15G	April	0.35	0.55	0.46
	May	0.39	0.55	0.48
	June	0.43	0.55	0.48
	2nd Quarter	0.35	0.55	0.47
W-9G	April	7.16	7.94	7.51
	May	7.12	7.77	7.45
	June	7.32	8.10	7.70
	2nd Quarter	7.12	8.10	7.56

Outside Slurry Wall

Well ID	Monitoring Period	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-2G	April	12.94	14.61	13.70
	May	11.88	13.09	12.75
	June	12.95	13.70	13.28
	2nd Quarter	11.88	14.61	13.22
W-4G	April	11.07	11.71	11.42
	May	10.79	11.28	11.04
	June	10.99	11.40	11.18
	2nd Quarter	10.79	11.71	11.24
W-4S	April	-0.03	2.87	1.39
	May	0.28	2.37	1.26
	June	0.20	2.85	1.40
	2nd Quarter	-0.03	2.87	1.35
W-6G	April	12.84	13.93	13.37
	May	12.56	13.48	13.00
	June	12.79	13.52	13.21
	2nd Quarter	12.56	13.93	13.21
W-6S	April	1.29	2.65	1.97
	May	1.36	2.26	1.79
	June	1.40	2.44	1.88
	2nd Quarter	1.29	2.65	1.88
W-8S	April	1.84	4.17	2.52
	May	1.91	4.08	2.46
	June	1.86	4.12	2.48
	2nd Quarter	1.84	4.17	2.49
W-13S	April	1.85	3.47	2.40
	May	1.87	3.20	2.30
	June	1.86	3.24	2.32
	2nd Quarter	1.85	3.47	2.34
W-13G	April	6.32	7.07	6.76
	May	6.20	6.93	6.62
	June	6.43	7.06	6.71
	2nd Quarter	6.20	7.07	6.69
W-10G	April	8.30	8.54	8.41
	May	8.19	8.33	8.24
	June	8.32	8.66	8.48
	2nd Quarter	8.19	8.66	8.38

Table 2-4
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-3RR	April	-0.33	2.79	1.40	W-4R	April	-0.52	2.69	1.09
	May	-0.27	2.22	0.98		May	-0.21	2.20	0.92
	June	0.18	2.52	1.36		June	-0.25	2.65	1.11
	2nd Quarter	-0.33	2.79	1.25		2nd Quarter	-0.52	2.69	1.04
W-5R	April	1.18	2.57	1.88	W-6R	April	1.29	2.63	1.96
	May	1.06	2.16	1.63		May	1.35	2.24	1.78
	June	1.17	2.39	1.76		June	1.39	2.42	1.87
	2nd Quarter	1.06	2.57	1.75		2nd Quarter	1.29	2.63	1.87
W-7R	April	1.69	2.86	2.24	W-8RR	April	2.02	4.36	2.70
	May	1.55	2.45	2.03		May	2.07	4.24	2.63
	June	1.79	2.66	2.17		June	2.02	4.30	2.64
	2nd Quarter	1.55	2.86	2.14		2nd Quarter	2.02	4.36	2.66

Table 2-5
KinBuc Landfill Operable Unit 1
Second Quarter 2001
Troll Water Level Elevations vs. Manual Water Elevations

OU 1	April 26			May 16			June 7			Average
Well ID	Troll	Manual	Difference	Troll	Manual	Difference	Troll	Manual	Difference	Difference
W-1G	11.09	11.03	0.06	11.21	11.03	0.18	12.47	12.22	0.25	0.16
W-2G	12.97	12.75	0.22	12.83	12.13	0.70	13.59	13.37	0.22	0.38
W-3G	10.49	10.14	0.35	10.66	10.41	0.25	10.64	10.42	0.22	0.27
W-3S	1.48	1.58	-0.10	0.61	0.64	-0.03	1.40	1.49	-0.09	-0.07
W-3RR	1.83	1.68	0.15	0.50	0.38	0.12	1.39	1.36	0.03	0.10
W-4G	11.24	11.25	-0.01	11.05	11.05	0.00	11.16	11.15	0.01	0.00
W-4S	1.79	1.70	0.09	0.99	0.79	0.20	1.60	1.57	0.03	0.11
W-4R	1.69	1.74	-0.05	0.51	0.64	-0.13	1.34	1.57	-0.23	-0.14
W-5G	10.50	10.69	-0.19	10.85	10.76	0.09	10.68	10.81	-0.13	-0.08
W-5S	1.49	1.82	-0.33	1.59	1.82	-0.23	1.64	1.96	-0.32	-0.29
W-5R	1.76	1.79	-0.03	1.75	1.76	-0.01	1.91	1.92	-0.01	-0.02
W-6S	1.85	1.89	-0.04	1.91	1.89	0.02	2.03	2.06	-0.03	-0.02
W-6R	1.81	1.88	-0.07	1.88	1.93	-0.05	2.01	2.04	-0.03	-0.05
W-7S	1.93	1.99	-0.06	2.06	2.08	-0.02	2.17	2.21	-0.04	-0.04
W-7R	2.03	2.10	-0.07	2.16	2.23	-0.07	2.31	2.36	-0.05	-0.06
W-8S	2.82	2.77	0.05	2.21	2.21	0.00	2.86	2.91	-0.05	0.00
W-8RR	2.89	2.72	0.17	2.39	2.21	0.18	2.86	2.90	-0.04	0.10
W-9G	7.35	7.53	-0.18	7.58	7.49	0.09	7.49	7.59	-0.10	-0.06
W-10G	8.44	8.47	-0.03	8.22	8.30	-0.08	8.41	8.47	-0.06	-0.06
W-13G	6.53	6.54	-0.01	6.48	6.30	0.18	6.80	6.60	0.20	0.12
W-13S	2.16	2.29	-0.13	2.15	2.17	-0.02	2.47	2.54	-0.07	-0.07
W-15G	0.44	0.77	-0.33	0.47	0.82	-0.35	0.49	0.87	-0.38	-0.35
W-15S	2.27	2.34	-0.07	2.36	2.30	0.06	2.57	2.57	0.00	0.00

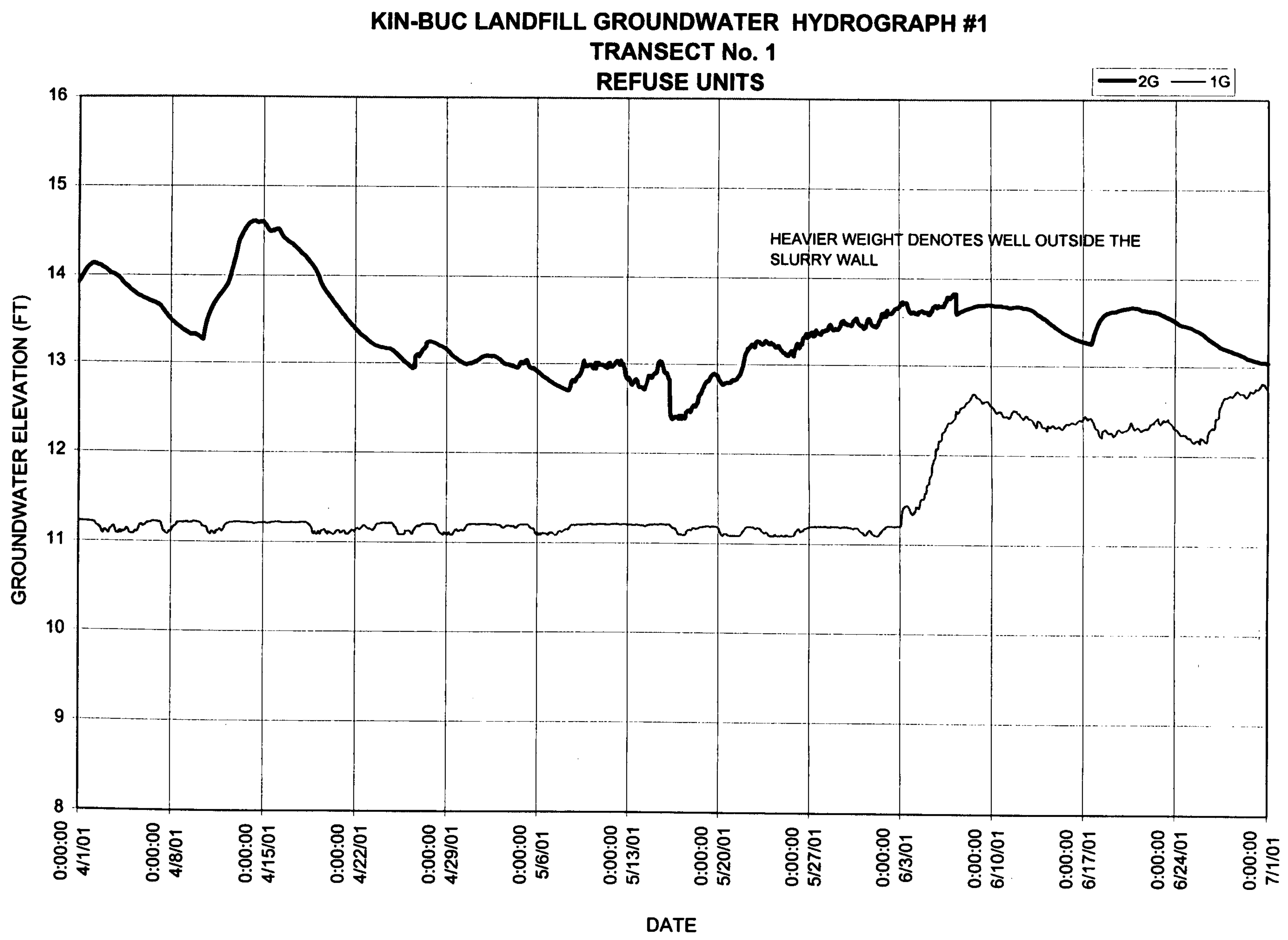
Table 5-1

Kin-Buc Landfill
Operable Unit 1
Second Quarter 2001 Modified Program
Gas Monitoring Well Network/Results

Well (Network) Location	Monitoring Result	
	% LEL	% GAS
GMW-01	0	0
GMW-02	0	0
GMW-03	0	0
GMW-04	0	0
GMW-05	0	0
GMW-06	0	0
Operational Flare Inlet	NA	49.2

APPENDIX A

OU1 REFUSE WELLS CONTINUOUS WATER LEVEL MONITORING RESULTS



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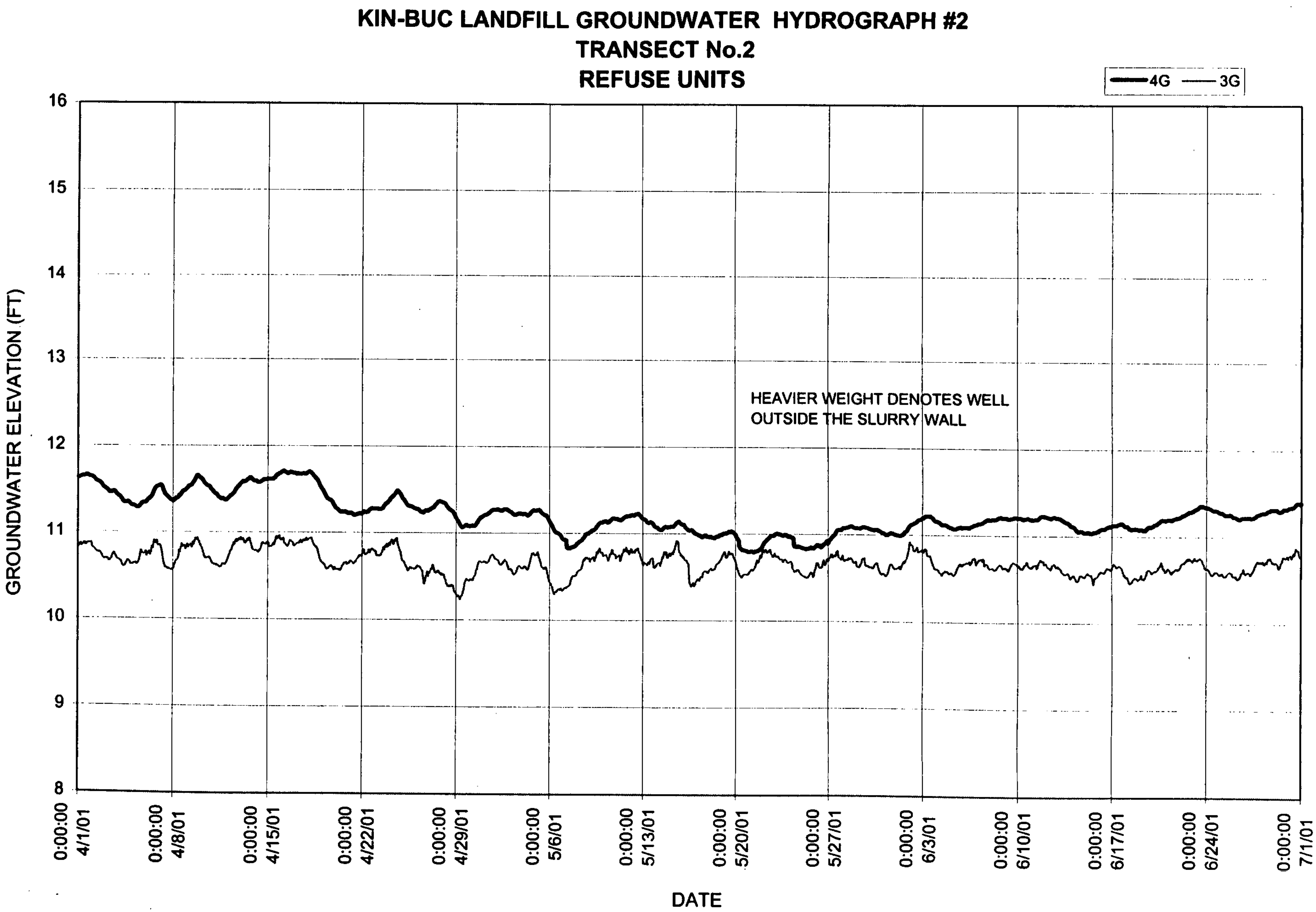

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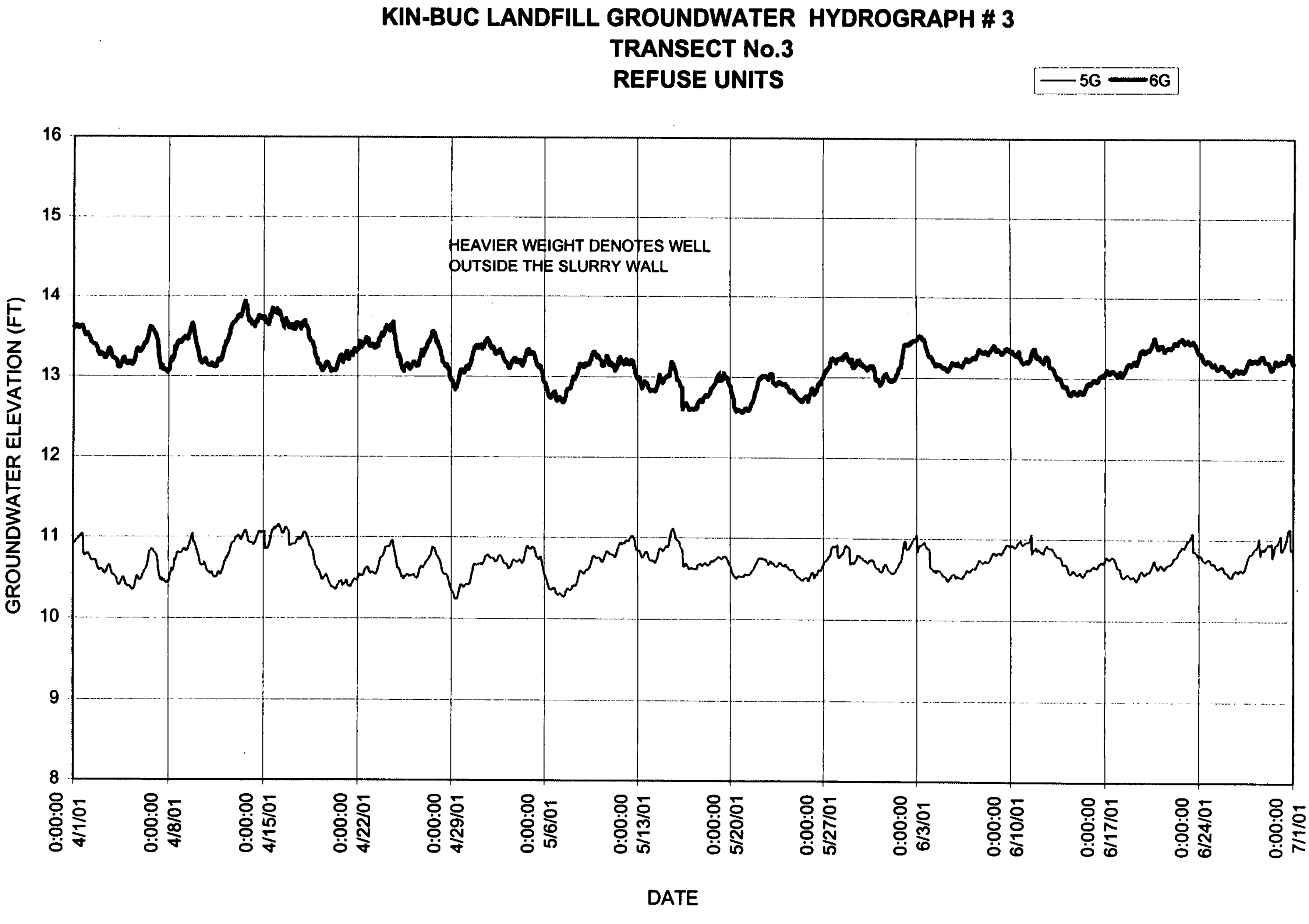

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KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #4
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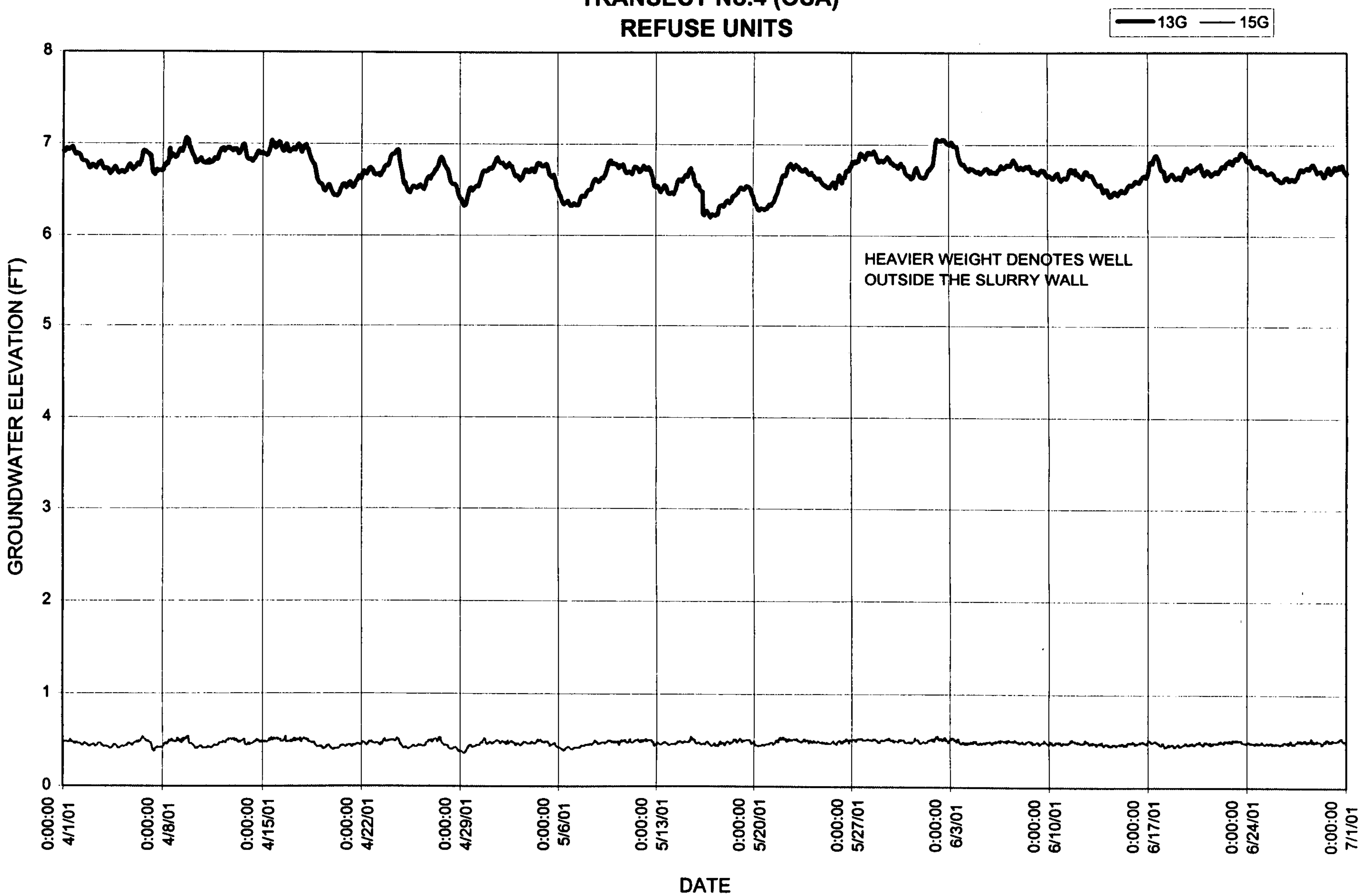

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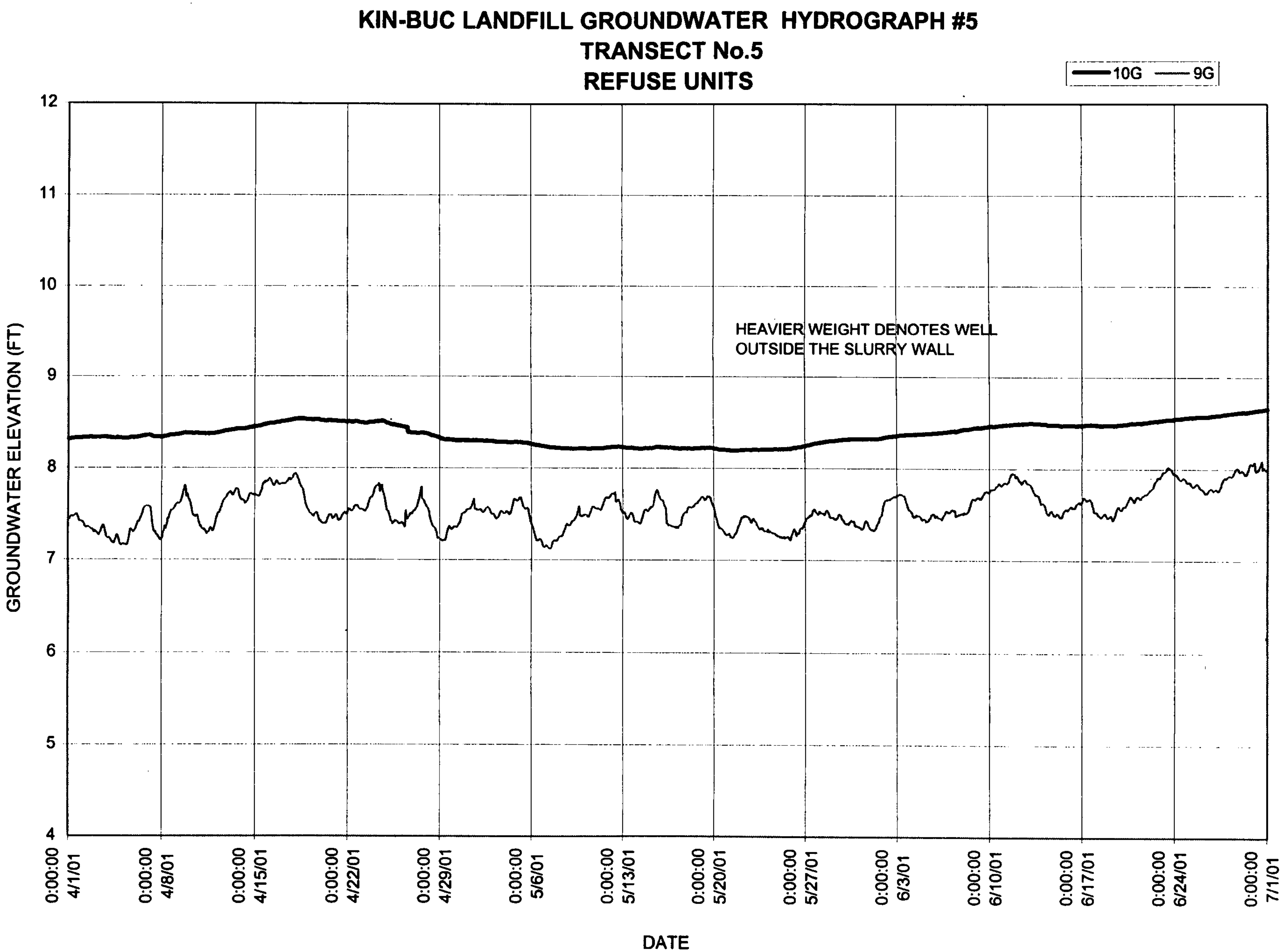

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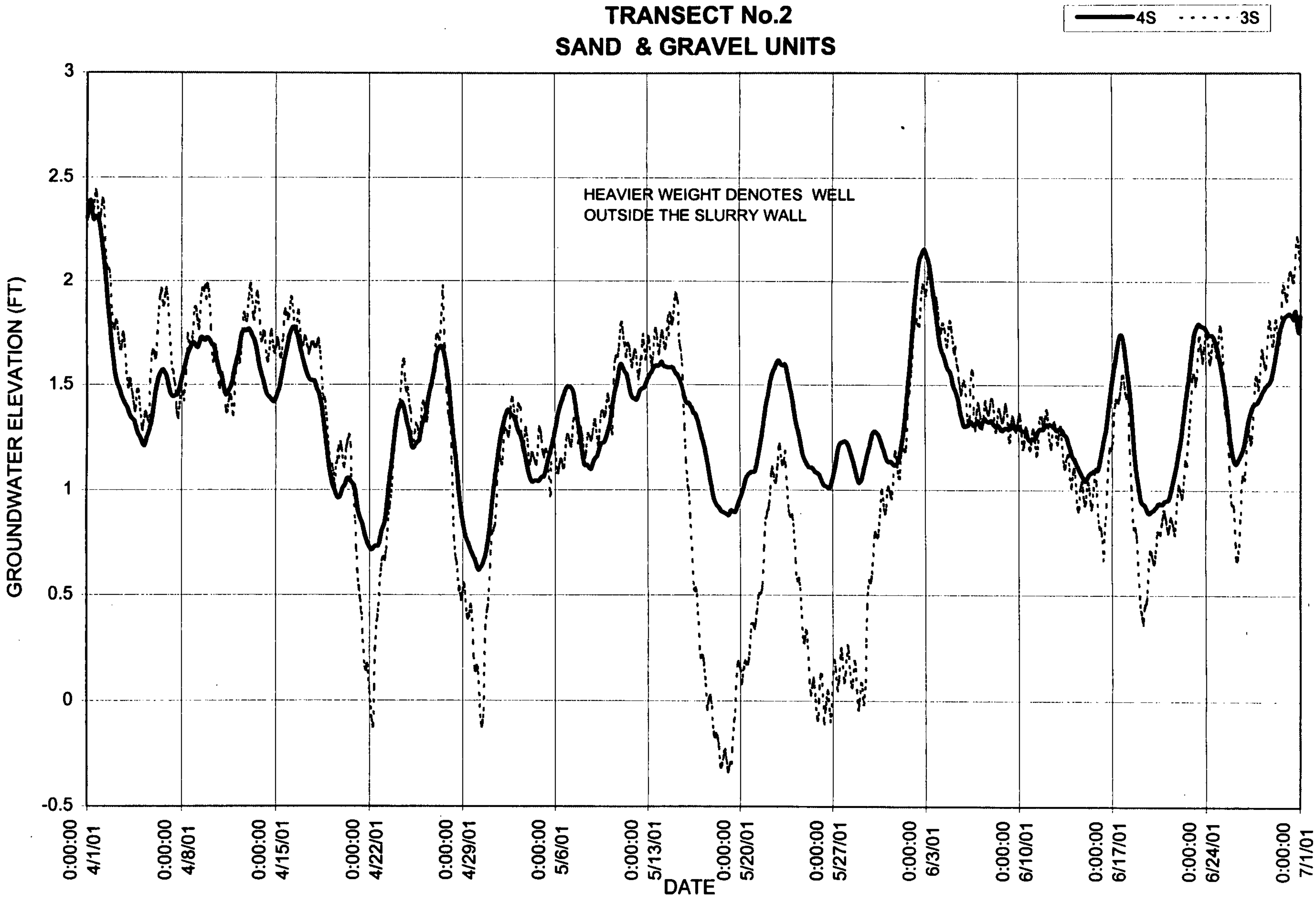
SAND & GRAVEL UNITS



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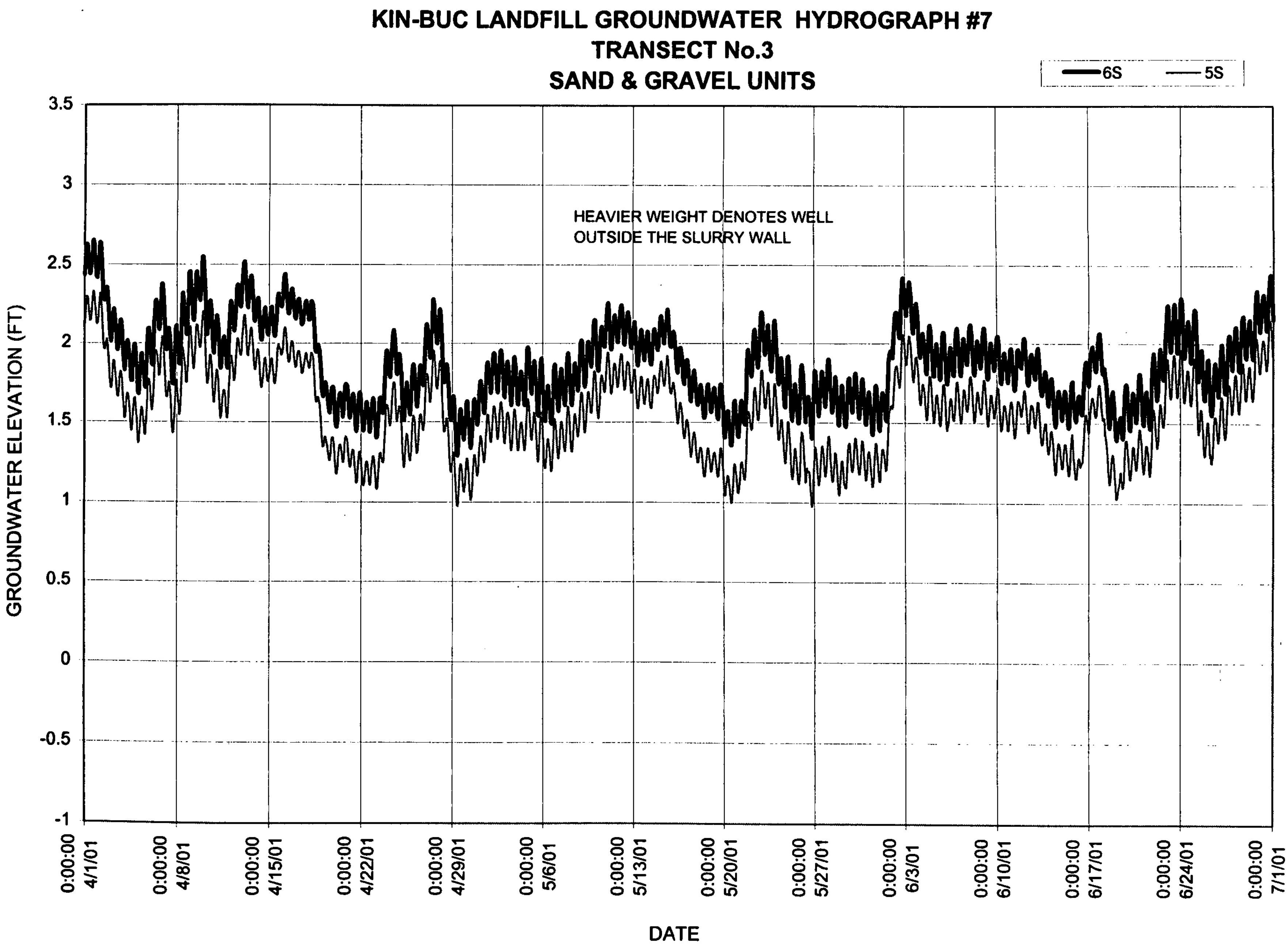

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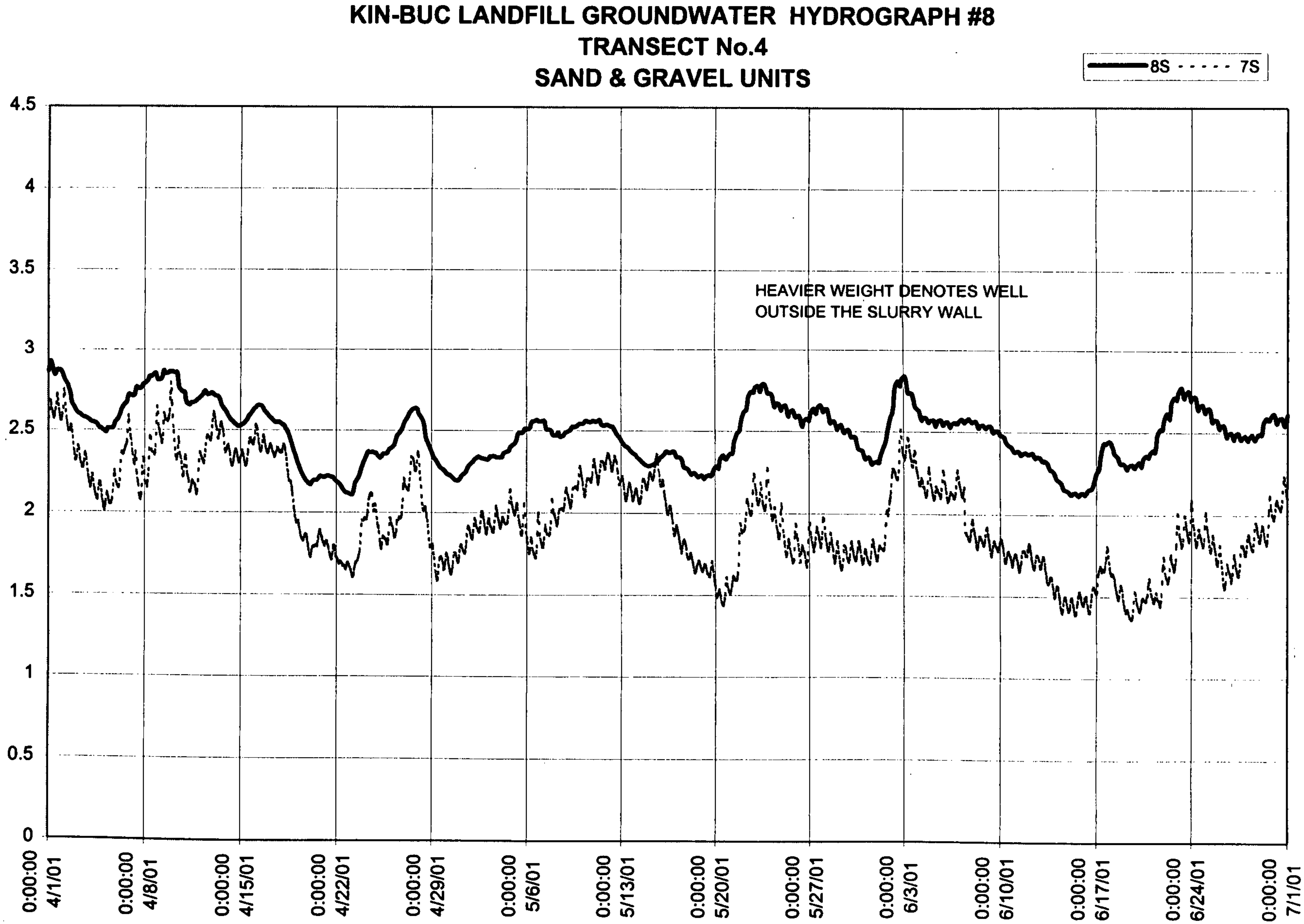

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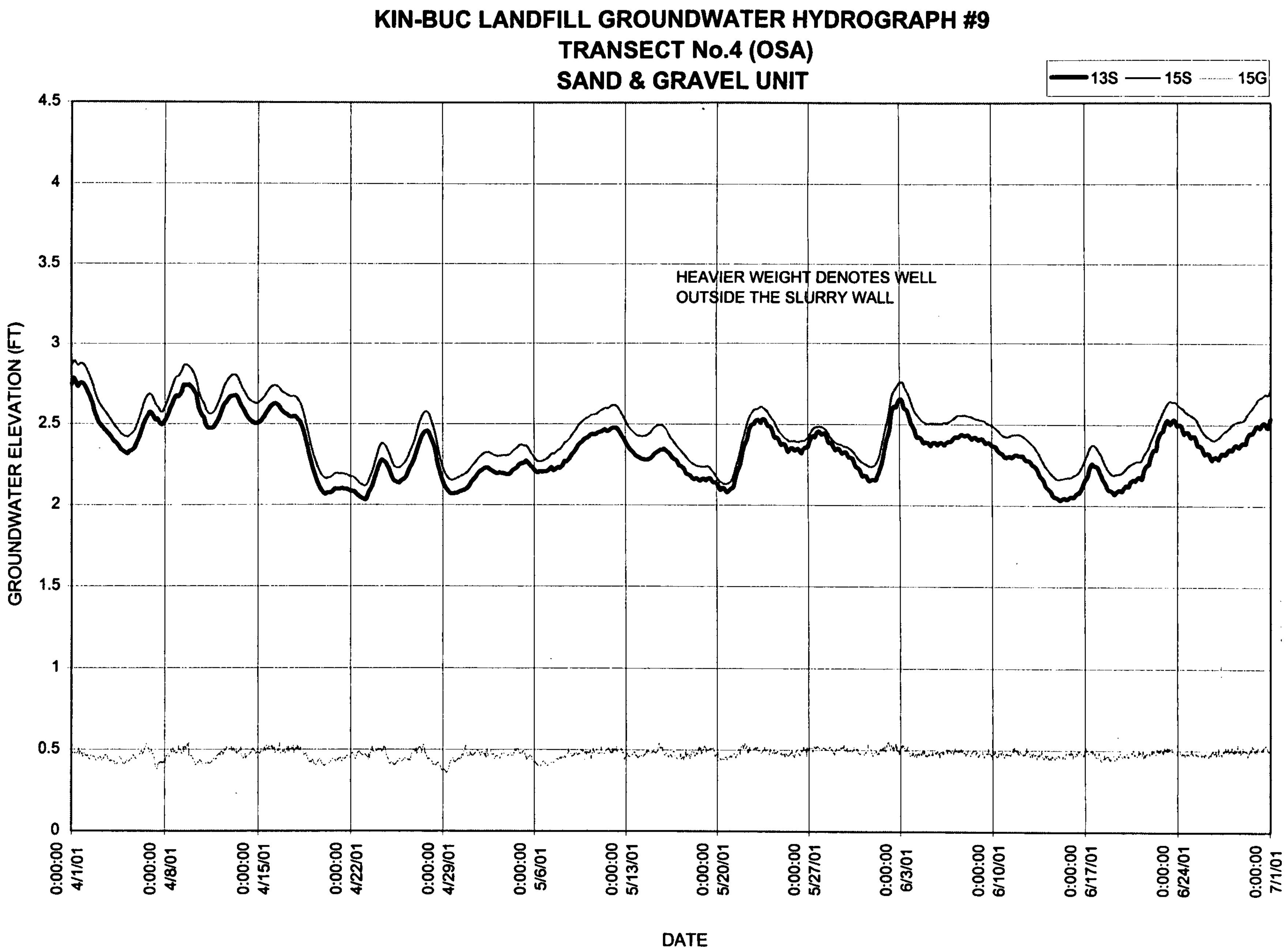

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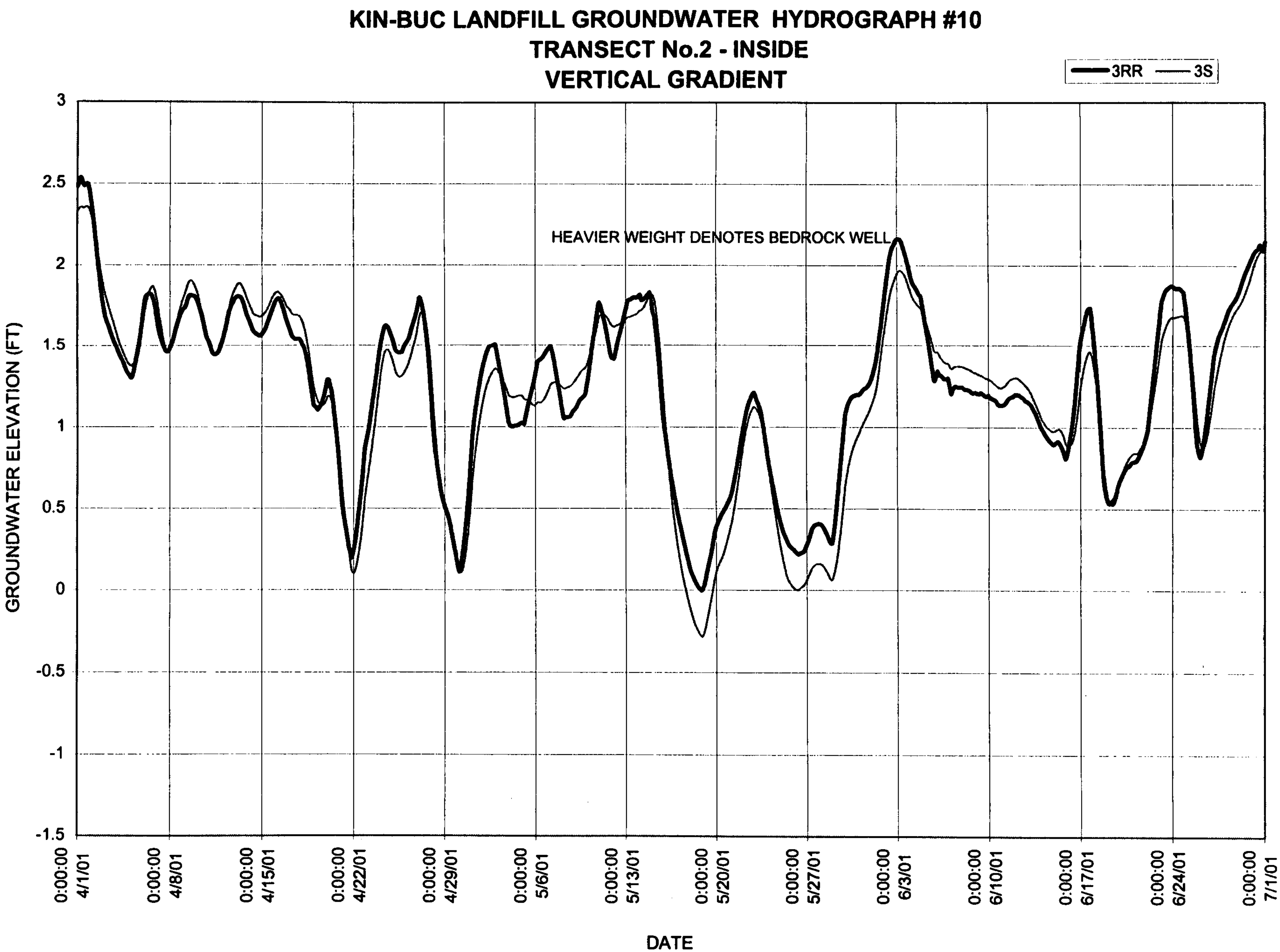

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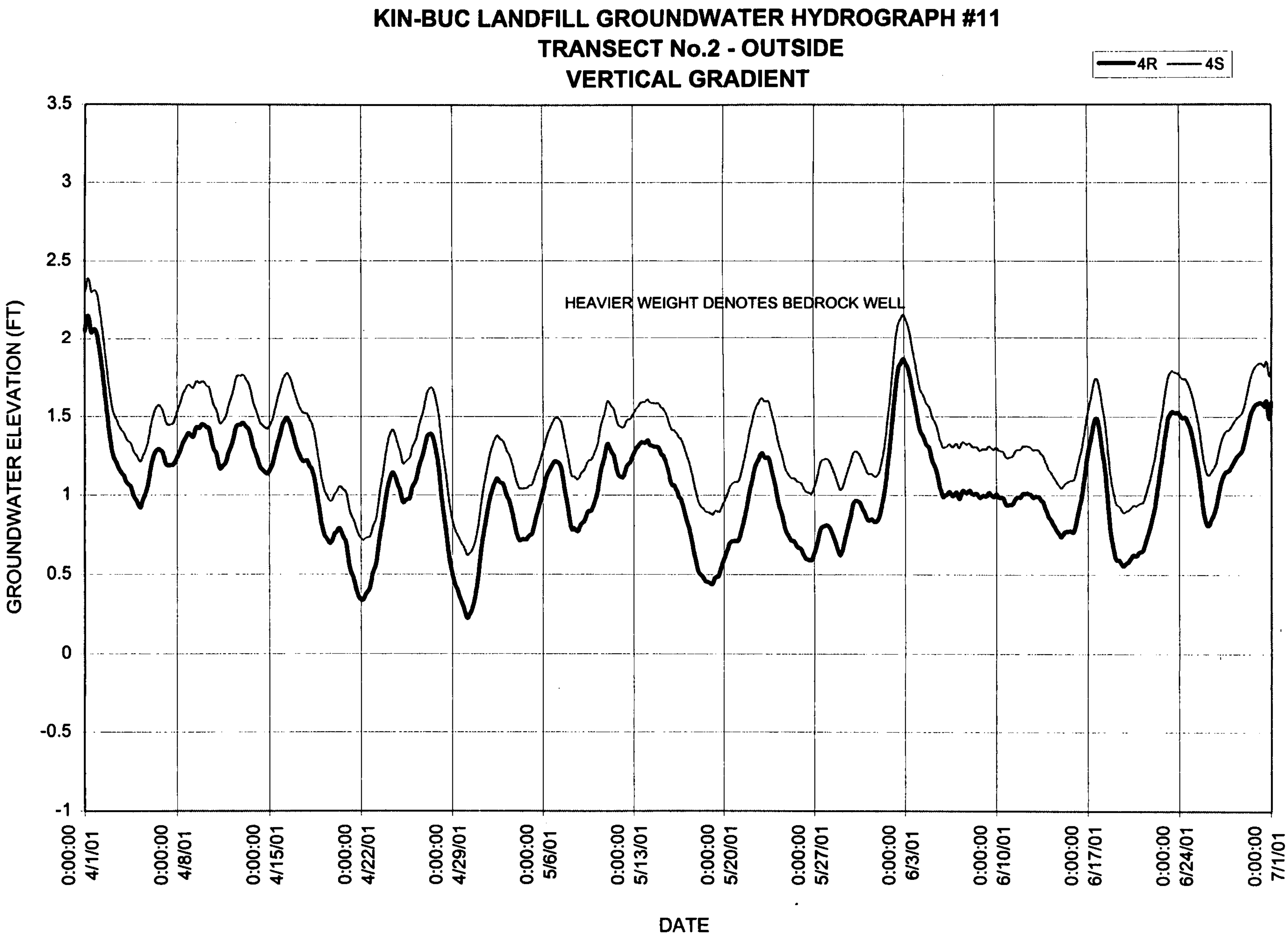

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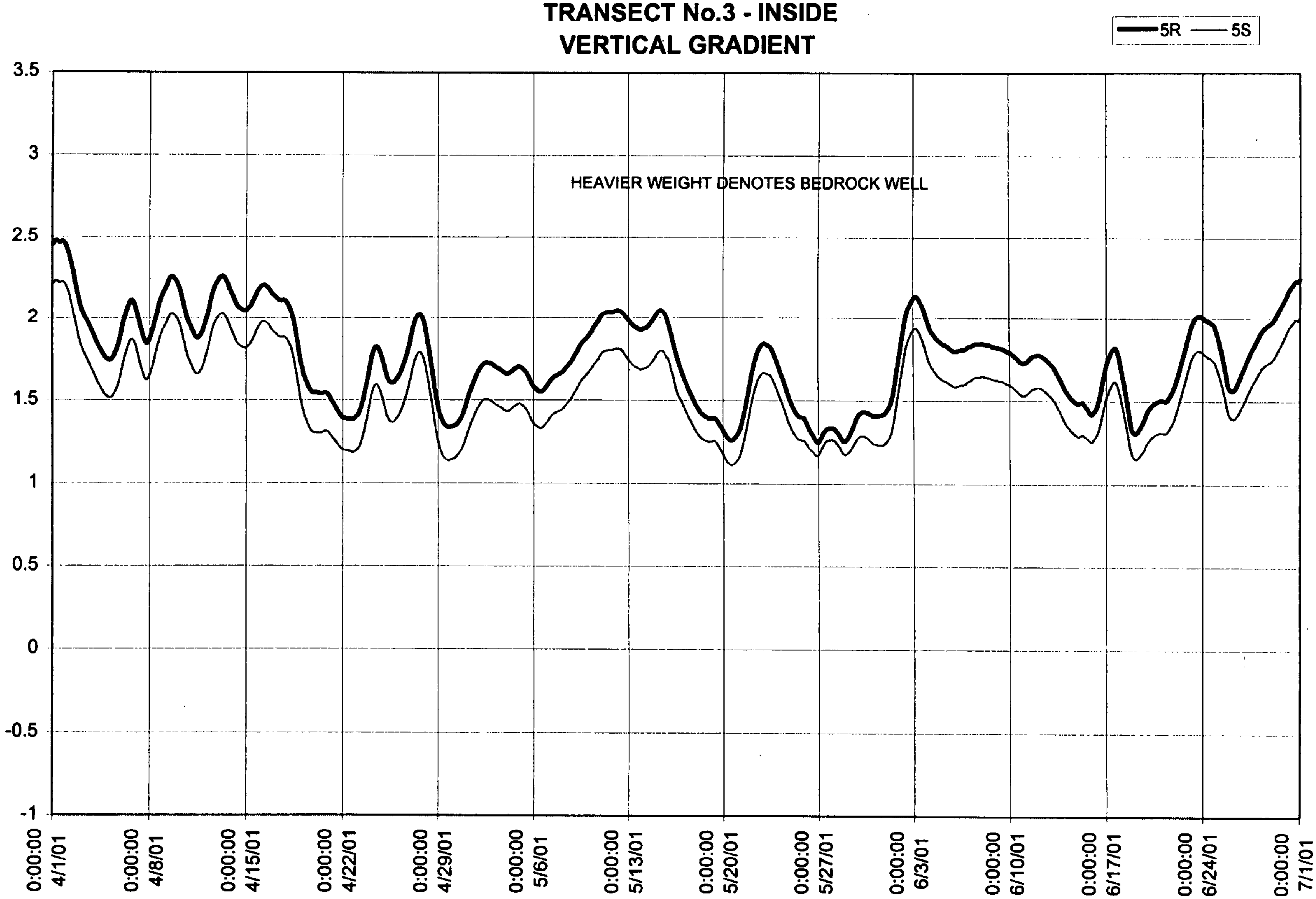
VERTICAL GRADIENT



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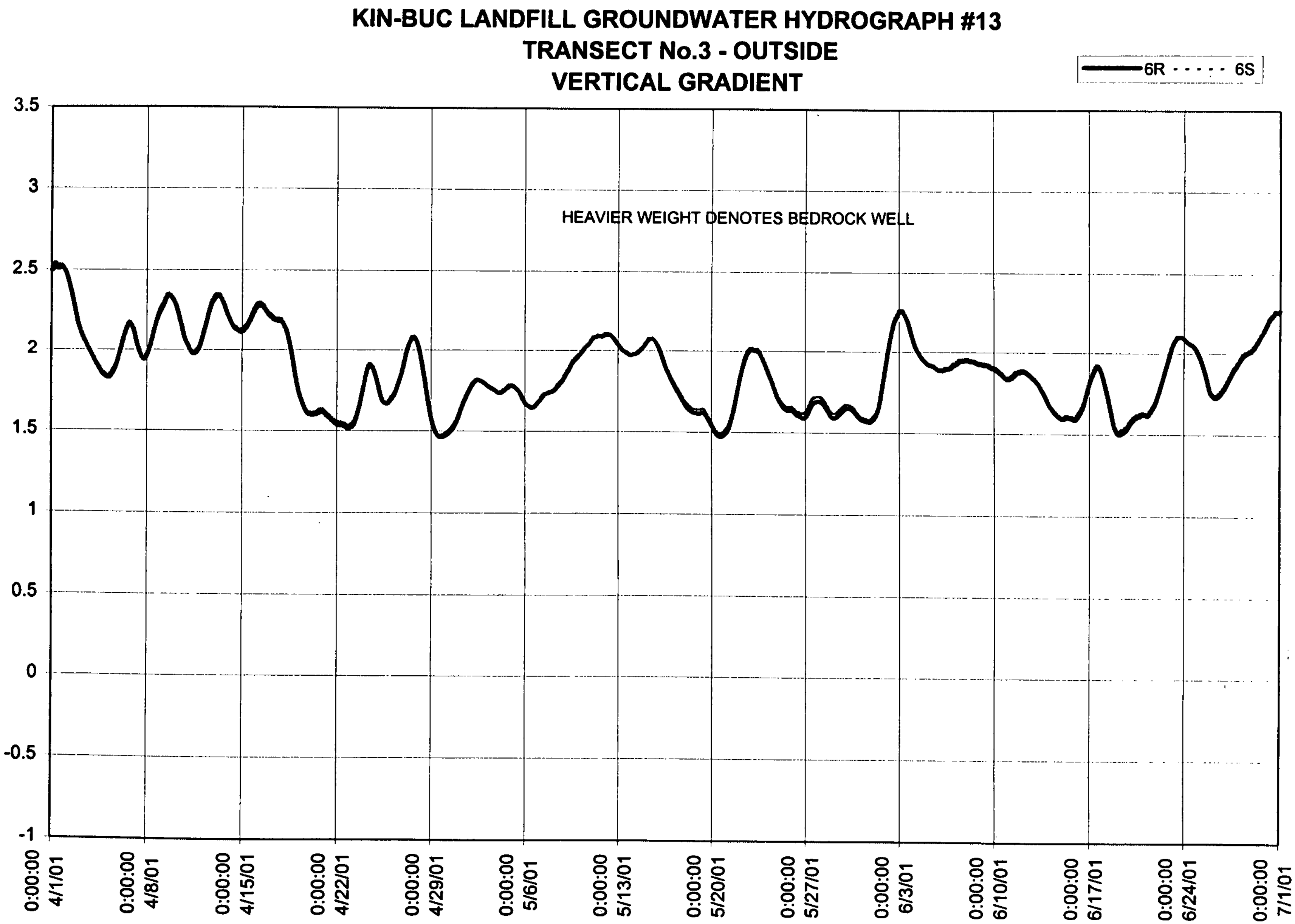

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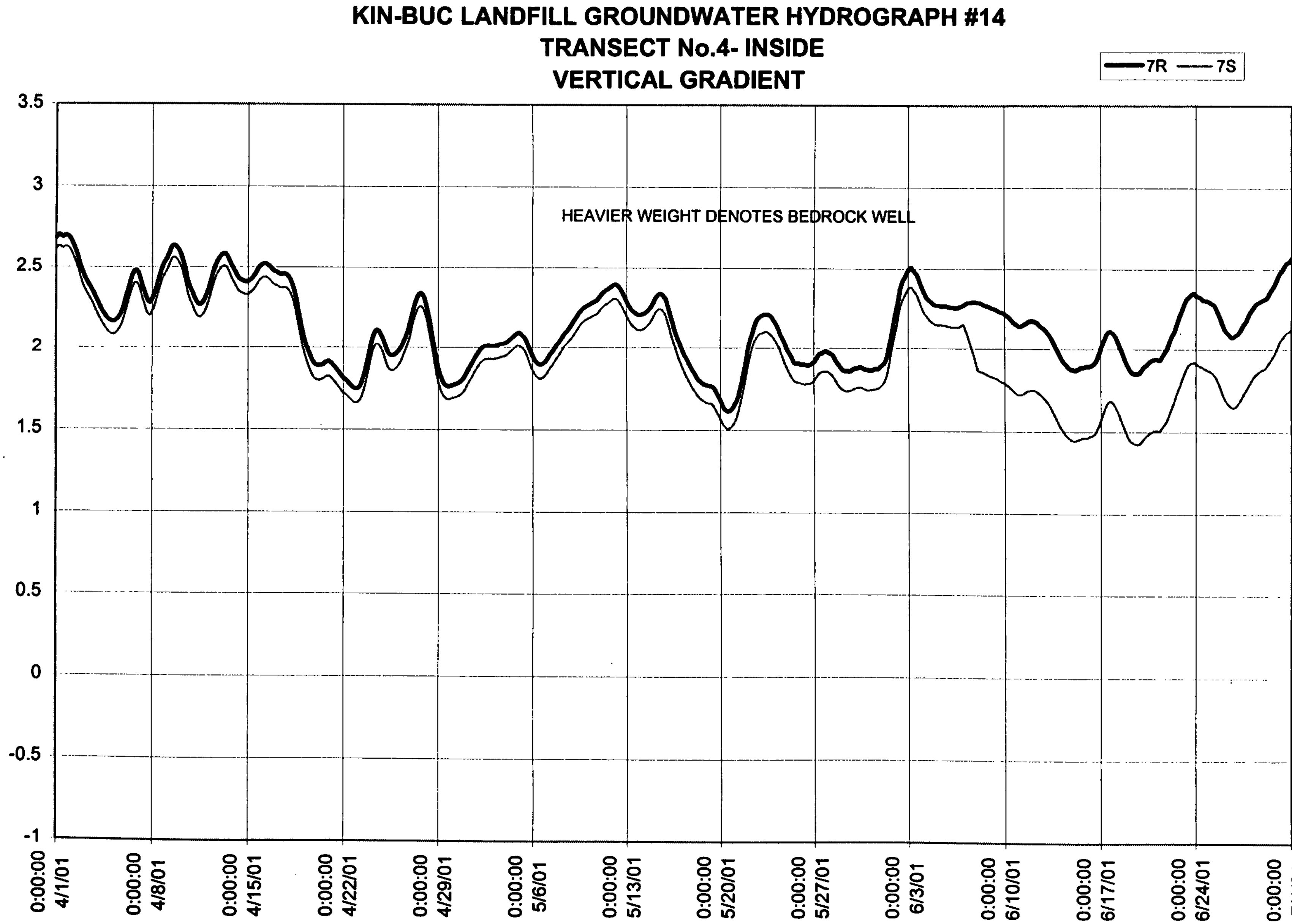

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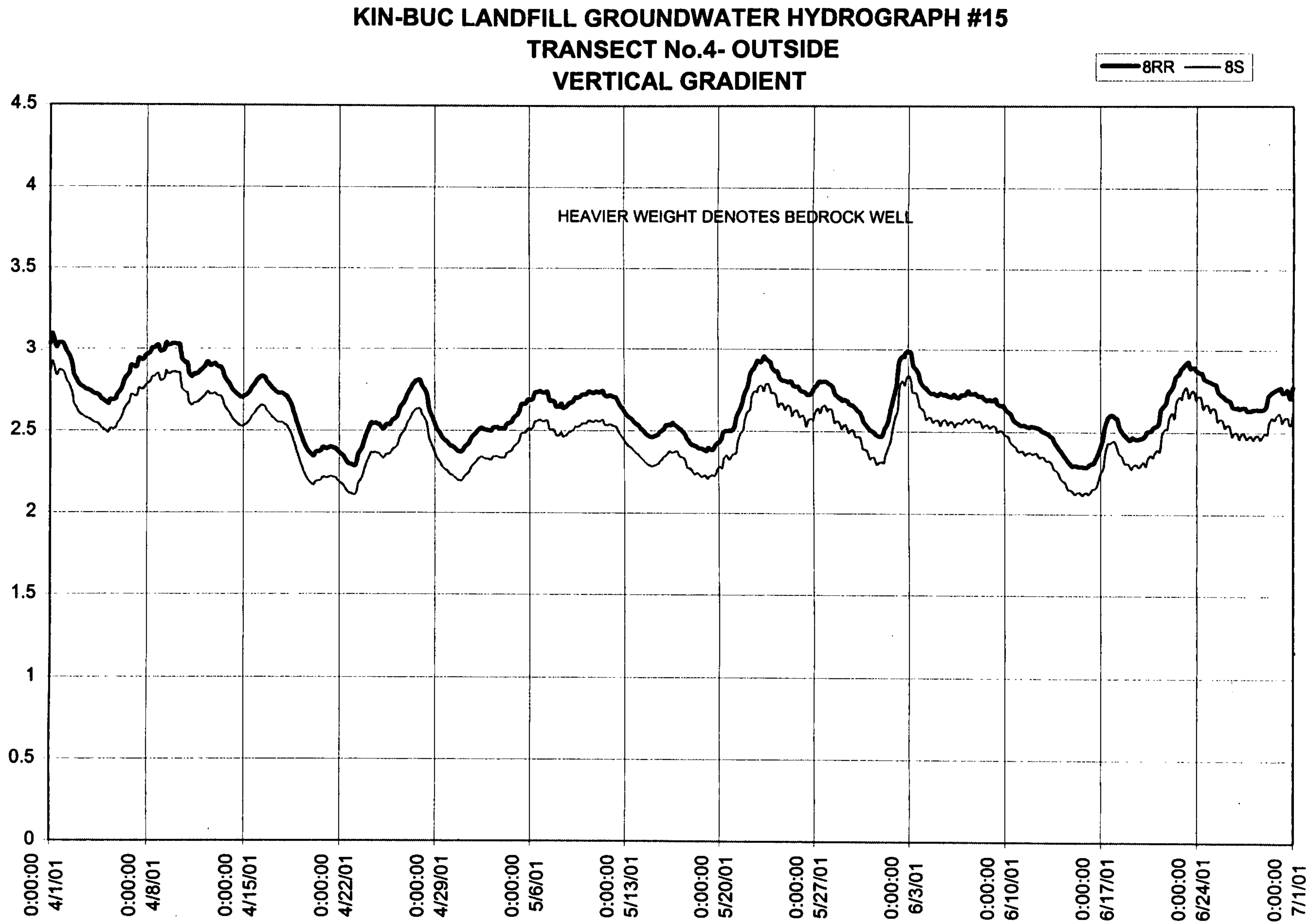

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APPENDIX B

MONTHLY HYDRAULIC EVALUATIONS

IT Corporation
Crossroads Corporate Center
One International Boulevard, Suite 700
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A Member of The IT Group

May 17, 2001
Project 796201

Carl Januszkiewicz
Waste Management, Inc.
Kin-Buc Landfill Treatment Plant
383 Meadow Road
Edison, NJ 08817

Re: Hydraulic Monitoring for April 2001

Dear Mr. Januszkiewicz:

A site visit was completed on April 26, 2001 to download water level recorder data and obtain manual water level measurements. The following is an update of the hydraulic monitoring for the month of April 2001 at the Kin-Buc Landfill. This information is to be included in the quarterly report, which is to be submitted to the EPA in mid-August.

The minimum, maximum, and average water elevations recorded at each well are included in Table 1. Water level elevations were compared with manual readings indicating that the Trolls are functioning properly and are recording accurate data. Attachment 1 shows the hydrographs for each of the transect locations.

The water levels in wells on the outside of the slurry wall vary significantly over the course of the day due to the tidal influence at the site. For clarity, Hydrographs 6 through 15 show the average water level in the well over a 24-hour period (12 hours before and 12 hours after).

Transect 1

Refuse (1G/2G)/Hydrograph #1 – Intragradient conditions were maintained throughout the month.

Transect 2

Refuse (3G/4G)/Hydrograph #2 - Intragradient conditions were maintained throughout the month.

Sand and Gravel (3S/4S)/Hydrograph #6 - Intragradient conditions were not consistently observed during the month. Water levels in Well 3S (inside) ranged from approximately -0.13 to 2.44 feet msl, with a monthly average of 1.50 feet msl. Water levels in Well 4S (outside) ranged from approximately 0.12 to 2.87 feet msl, with a monthly average of 1.44 feet.

Vertical Gradient (3S/3RR)-Inside/Hydrograph #10 – Upward gradient conditions were not consistently maintained between the bedrock and overlying sand & gravel units inside the slurry wall. The average monthly water elevation for both Well 3S (sand & gravel) and 3RR (bedrock) was 1.50 feet msl.

Vertical Gradient (4S/4R)-Outside/Hydrograph #11 – The vertical gradient between the bedrock and overlying sand & gravel units was in a downward direction. The average monthly water elevation for Well 4S (sand & gravel) and 4R (bedrock) was 1.44 and 1.16 feet msl, respectively.

Transect 3

Refuse (5G/6G)/Hydrograph #3 – Intragradient conditions were maintained throughout the month.

Sand and Gravel (5S/6S)/Hydrograph #7 - Intragradient conditions were maintained throughout the month.

Vertical Gradient (5R/5S)-Inside/Hydrograph #12 – Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units inside the slurry wall throughout the month.

Vertical Gradient (6R/6S)-Outside/Hydrograph #13 – Upward gradient conditions were not observed between the bedrock and overlying sand & gravel units outside the slurry wall. The difference in average monthly water elevations for Well 6S (sand & gravel) and 6R (bedrock) did not indicate a dominant flow direction.

Transect 4

Refuse Oil Seeps Area (13G/15G)/Hydrograph #4 - Intragradient conditions were maintained throughout the month.

Sand and Gravel Oil Seeps Area (13S/15S)/Hydrograph #9 - Due to an upward gradient between the sand & gravel and refuse units in the oil seeps area, groundwater was not collected from the sand & gravel unit. Hydrograph 9 shows the ambient conditions between Wells W-15S (outside) and W-13S (inside) in the sand & gravel unit. Water levels from well 15G in the refuse unit are included on the hydrograph for comparison.

Sand and Gravel (7S/8S)/Hydrograph #8 - Intragradient conditions were maintained throughout the month.

Vertical Gradient (7R/7S)-Inside/Hydrograph #14 - Upward gradient conditions were maintaned between the bedrock and overlying sand & gravel units inside the slurry wall throughout the month.

Vertical Gradient (8RR/8S)-Outside/Hydrograph #15 - Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units outside the slurry wall throughout the month.

Transect 5

Refuse (9G/10G)/Hydrograph #5 – Intragradient conditions were maintained throughout the month.

Figure 1 shows the hydraulic profile summary for April 2001.

Groundwater and Leachate Collection

Based on data provided by U.S. Filter, the following volumes of groundwater and leachate were extracted from the sand and gravel wells and leachate collection system for the period from April 1 to April 30, 2001:

S&G #1 Groundwater	S&G #2 Groundwater	S&G #3 Groundwater	S&G #4 Groundwater	Leachate
59,290 gal.	219,054 gal.	55,001 gal.	0 gal.	34,431 gal.
1,976 gpd	7,302 gpd	1,833 gpd	0 gpd	1,148 gpd

For the period, a total of 333,345 gallons of groundwater was collected. The average groundwater extraction rate of 11,111 gpd is below the recommended extraction rate of 15,000 gpd.

The leachate extraction rate of 1,148 gpd is below the recommended rate of 1,500 gpd, however intragradient conditions were maintained in the refuse unit through out the month. Based on the hydraulic data from April and the first quarter of 2001, it appears that a leachate collection rate of 1,200 gpd is sufficient to maintain hydraulic containment in the refuse unit.

CONCLUSIONS/RECOMMENDATIONS

Intragradient conditions were maintained in the refuse unit at all of the transect locations throughout the month. Leachate collection rates should be maintained at 1,200 gpd.

Intragradient conditions were maintained in the sand & gravel unit at transects 3 and 4. Intragradient conditions were not observed in the sand & gravel unit at transect 2.

Upward gradient conditions were maintained between the bedrock and overlying sand & gravel unit at transect 3 inside the slurry wall and at transect 4 outside the slurry wall. Downward gradient conditions were observed between the bedrock and sand & gravel unit at transect 2 outside the slurry wall.

Upward vertical gradients were not consistently maintained between the bedrock and sand and gravel at transect 2 (Wells 3RR/3S). Accordingly, groundwater extraction rates should be increased, especially at S&G Well 2, to impose a more consistent upward gradient at this location. The recommended extraction rates for S&G Wells 2 and 3 are 10,000 gpd and 5,000 gpd, respectively. Increasing the extraction rate may also increase the potential for creating more consistent intragradient conditions at the sand and gravel unit at transect 2.

We trust you find this information useful. If you have any questions, please do not hesitate to contact us.

Sincerely,

IT Corporation

Steven Goldberg, Ph.D, CPG
Senior Hydrogeologist

Thomas Connors, P.E.
Project Manager

Attachments

cc: Glenn Grieb, US Filter

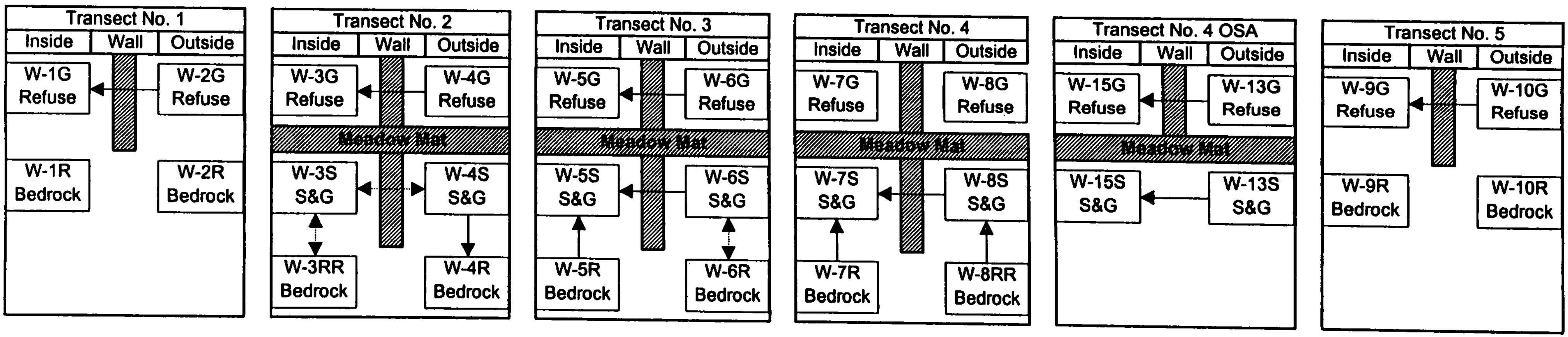
Table 1
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

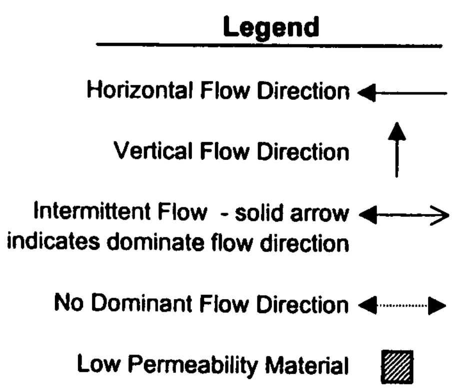
Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-1G	April	11.09	11.23	11.17	W-2G	April	12.94	14.61	13.80
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-3G	April	10.49	10.96	10.76	W-4G	April	11.20	11.71	11.46
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-3S	April	-0.13	2.44	1.50	W-4S	April	0.11	2.87	1.44
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-5G	April	10.35	11.16	10.71	W-6G	April	13.05	13.93	13.40
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-5S	April	1.08	2.33	1.69	W-6S	April	1.40	2.65	2.02
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-7S	April	1.61	2.79	2.20	W-8S	April	1.84	4.17	2.54
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-15S	April	2.60	3.28	2.53	W-13S	April	1.85	3.47	2.43
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-15G	April	0.38	0.55	0.46	W-13G	April	6.43	7.07	6.78
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			
W-9G	April	7.16	7.94	7.53	W-10G	April	9.32	8.54	8.43
	May					May			
	June					June			
	2nd Quarter					2nd Quarter			

Table 1
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-3RR	April May June 2nd Quarter	-0.23	2.79	1.50	W-4R	April May June 2nd Quarter	-0.40	2.69	1.16
W-5R	April May June 2nd Quarter	1.29	2.57	1.92	W-6R	April May June 2nd Quarter	1.39	2.62	2.00
W-7R	April May June 2nd Quarter	1.69	2.86	2.28	W-8RR	April May June 2nd Quarter	2.02	4.35	2.72

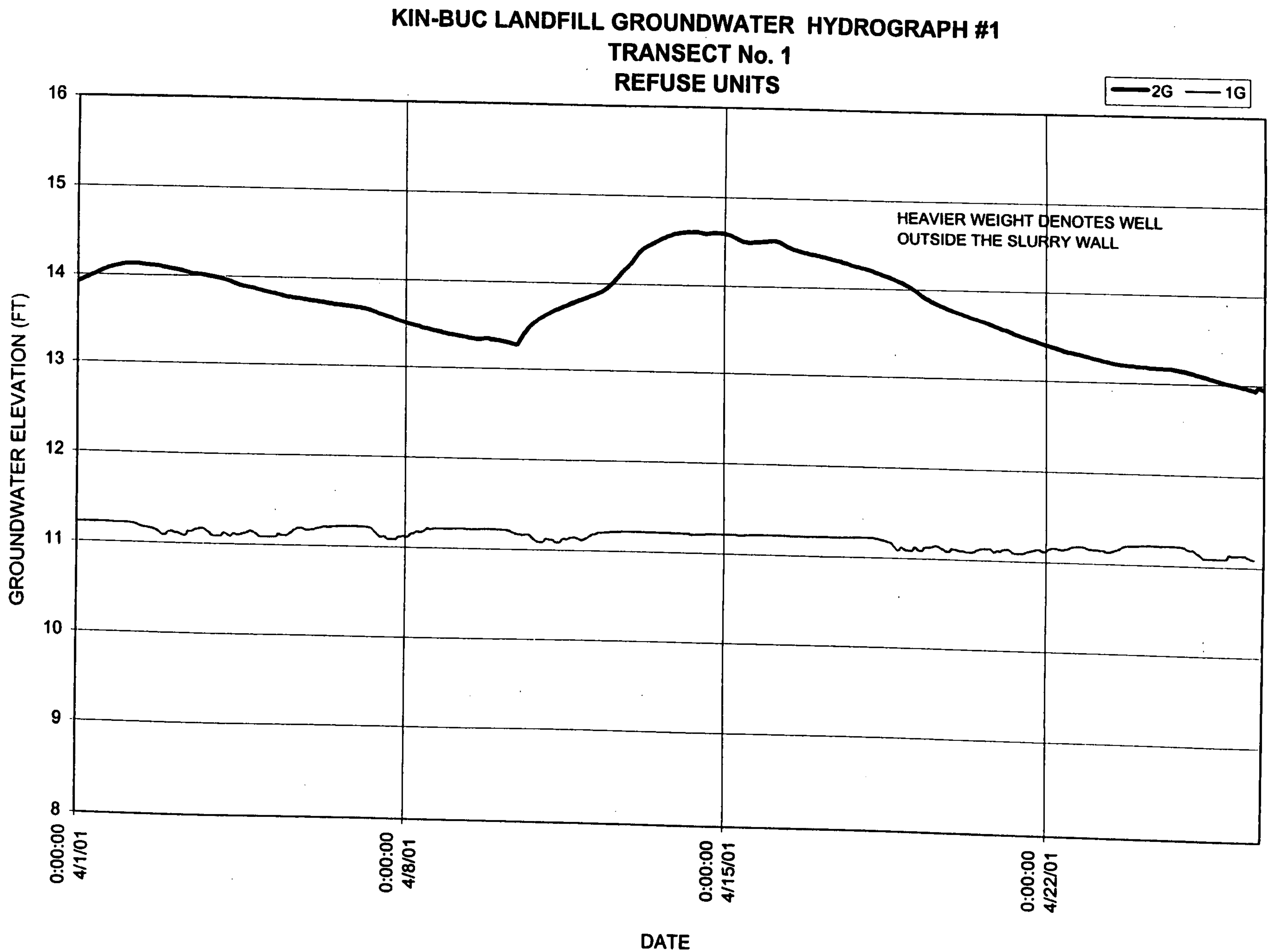
Figure 1
Kin-Buc Landfill
April Hydraulic Profile Summary





n://proj/kinbuc/quartrptbls/2nd-01/Figure1

Attachment 1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TRANSECT No. 1
REFUSE UNITS
2G
1G
HEAVIER WEIGHT DENOTES WELL OUTSIDE THE SLURRY WALL
GROUNDWATER ELEVATION (FT)
16
15
14
13
12
11
10
9
8
0:00:00 4/1/01
0:00:00 4/8/01
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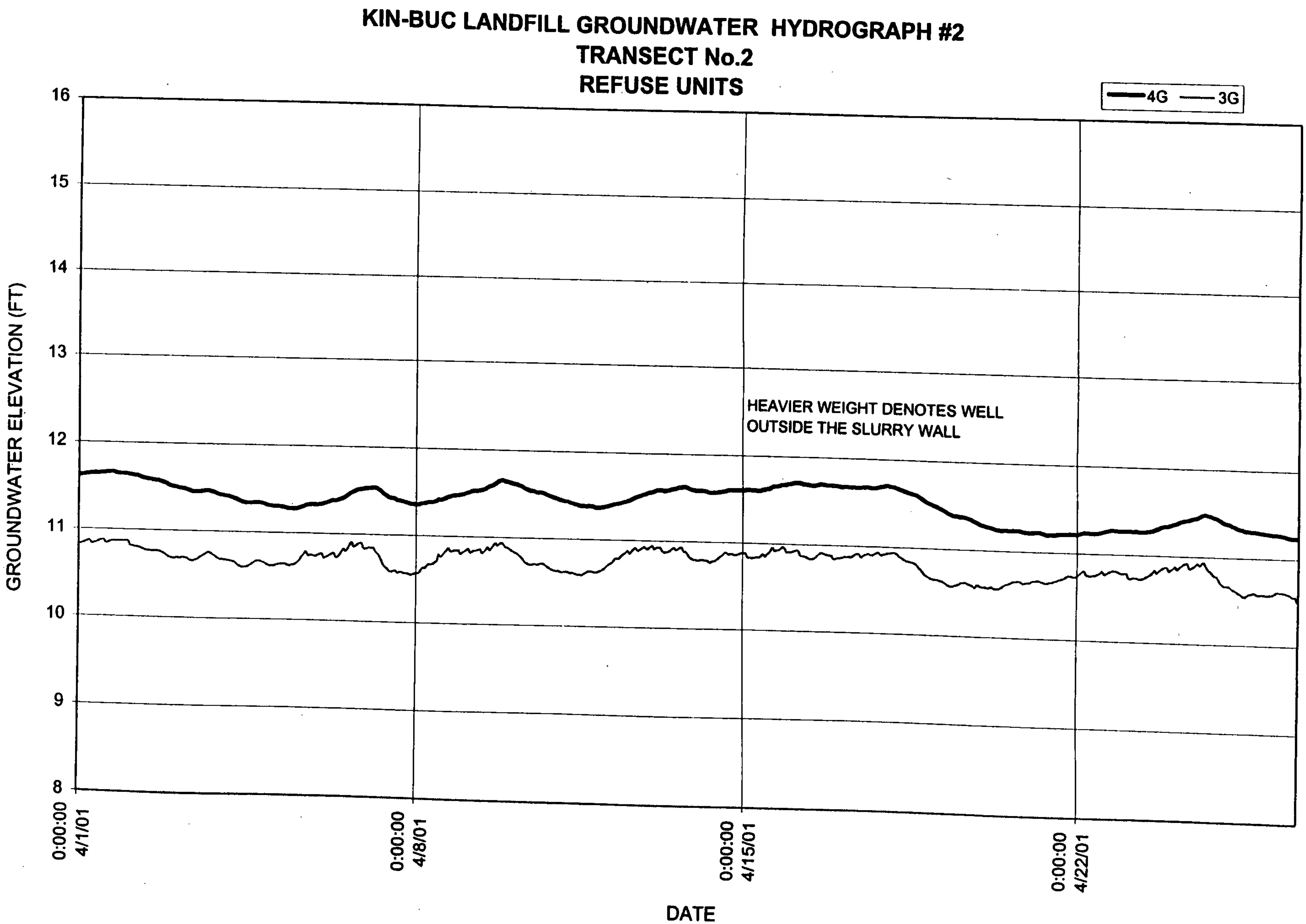
0:00:00 4/22/01
DATE



KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #2
TRANSECT No.2
REFUSE UNITS
4G
3G
HEAVIER WEIGHT DENOTES WELL OUTSIDE THE SLURRY WALL
GROUNDWATER ELEVATION (FT)
16
15
14
13
12
11
10
9
8
0:00:00 4/1/01
0:00:00 4/8/01
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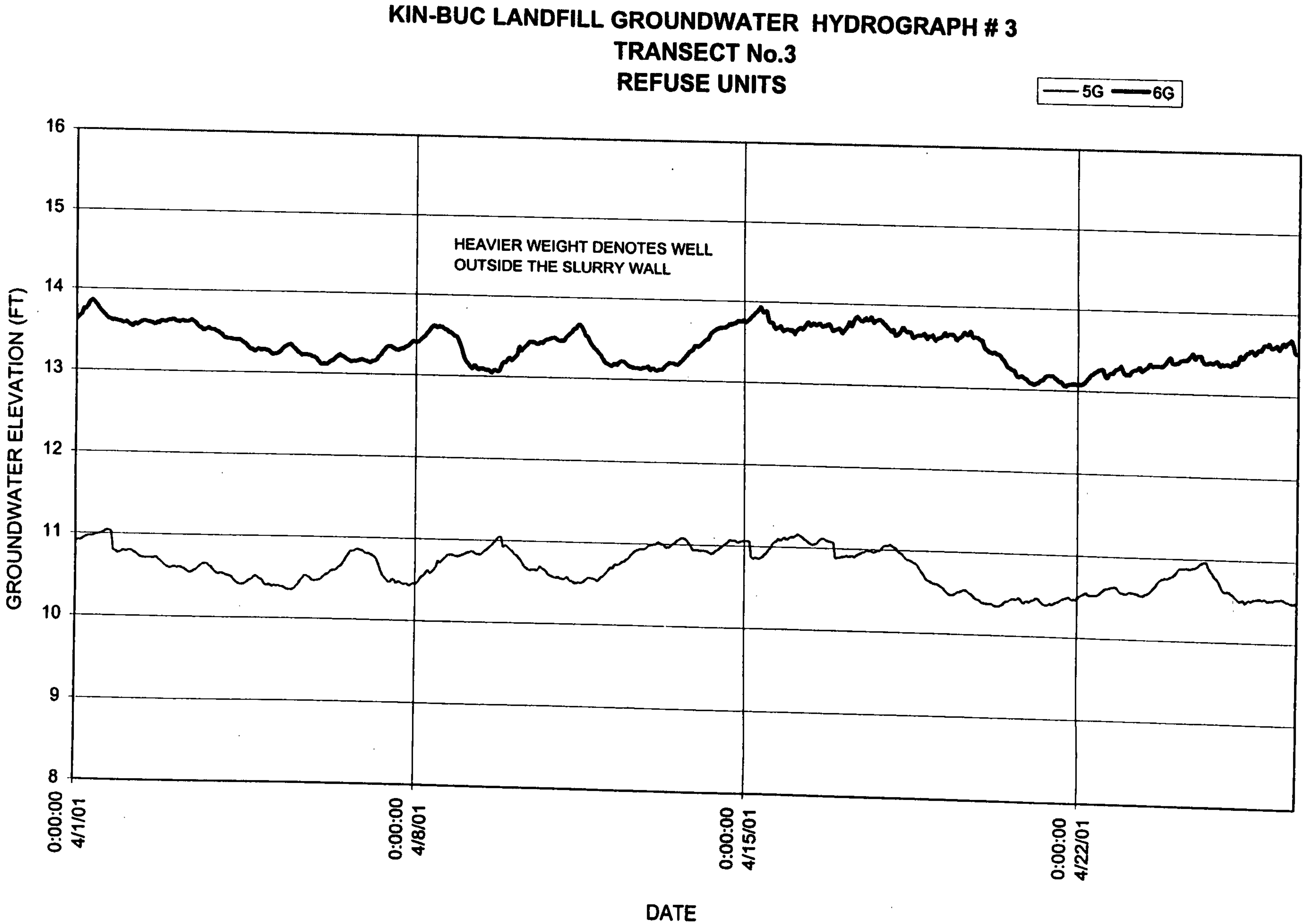
0:00:00 4/22/01
DATE



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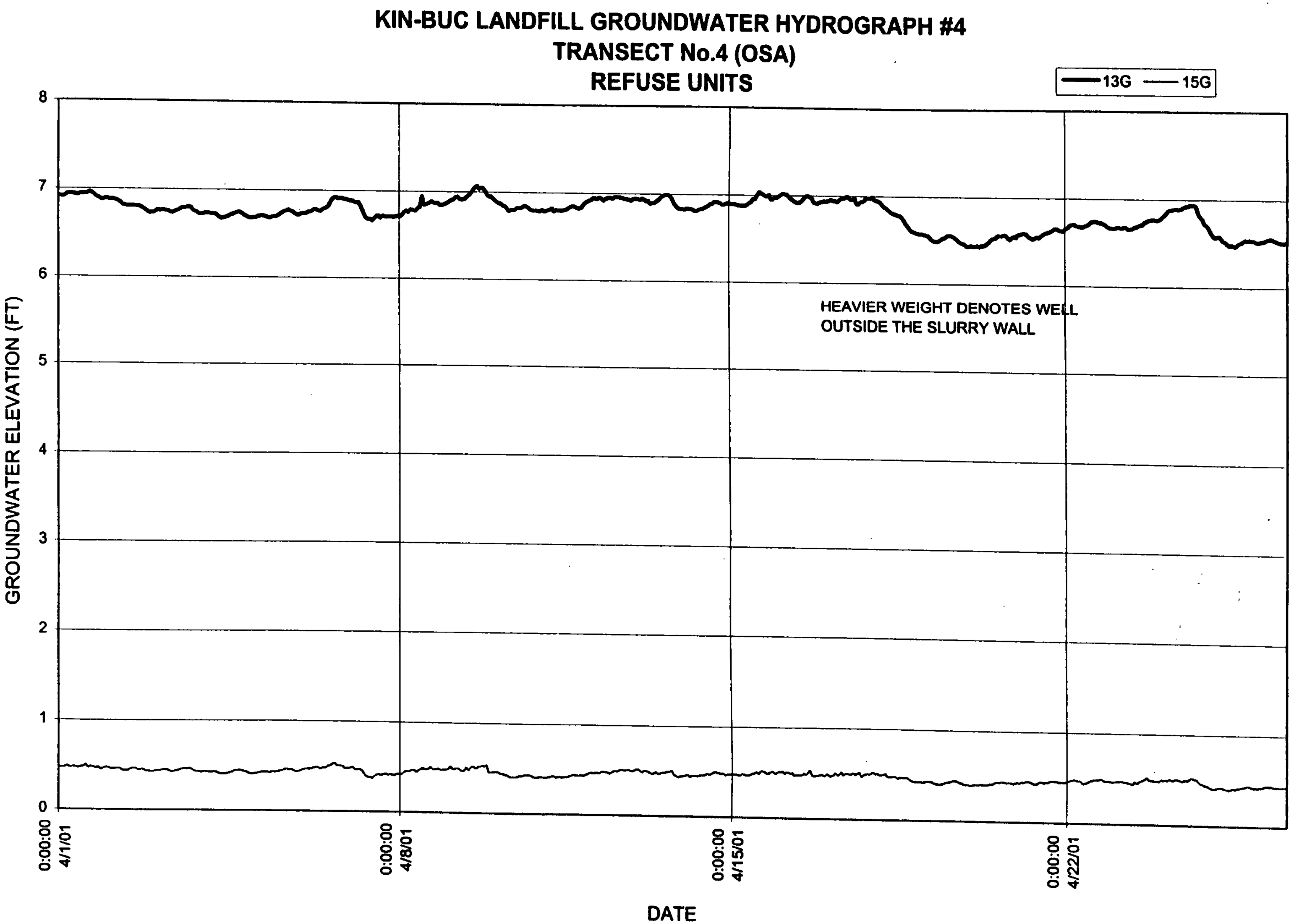

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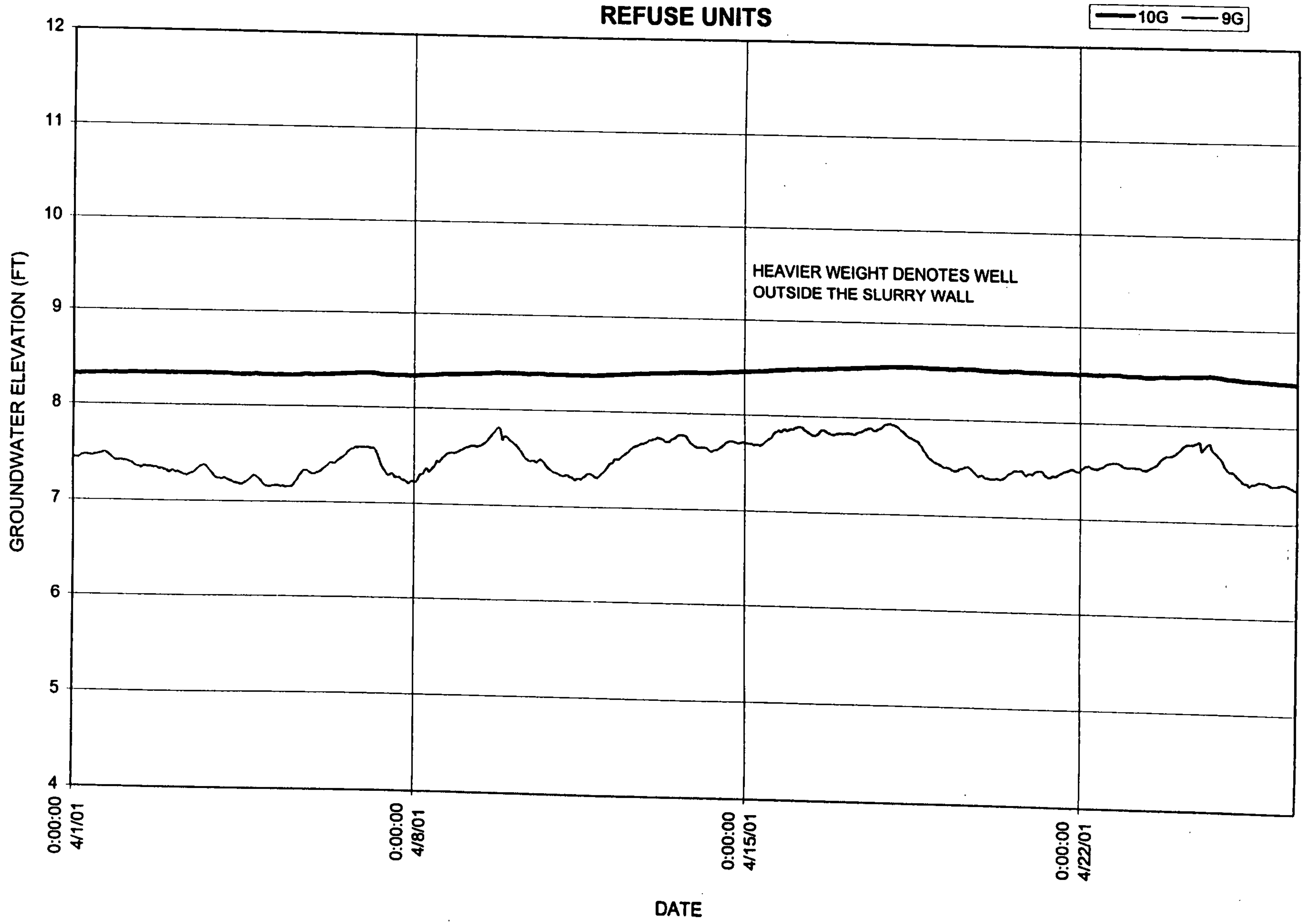
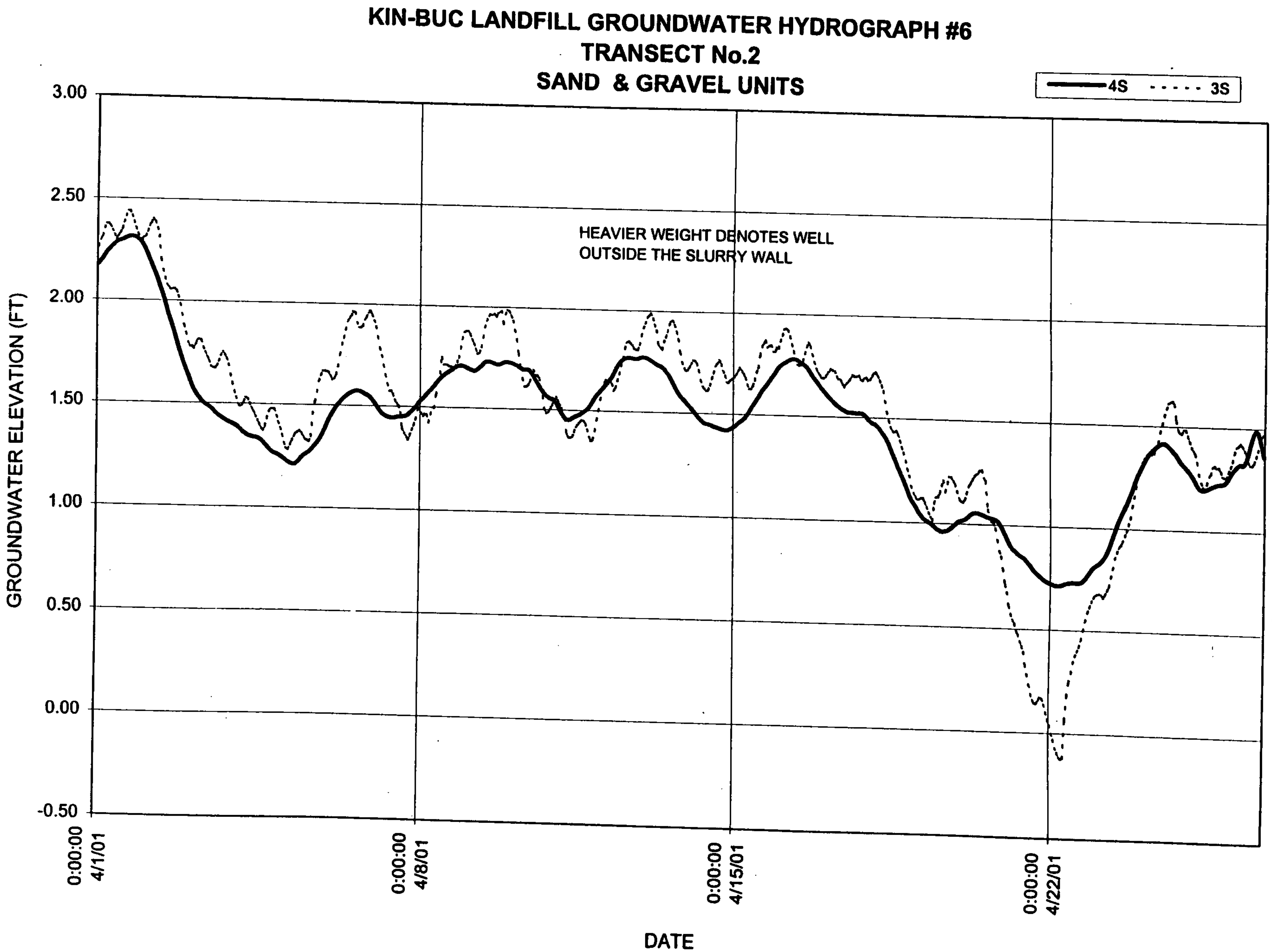
KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #5
TRANSECT No.5
REFUSE UNITS





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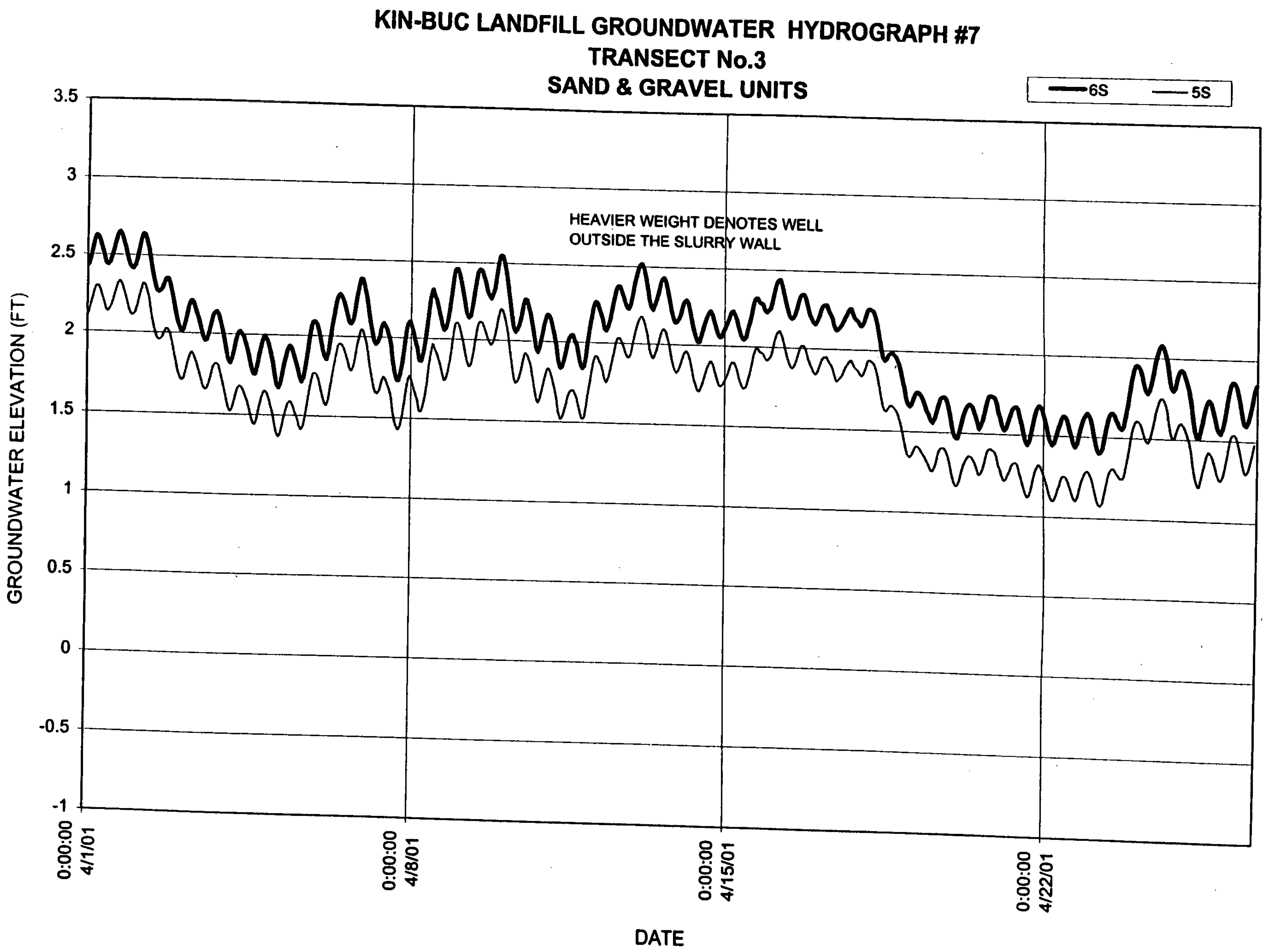
KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #7
TRANSECT No.3
SAND & GRAVEL UNITS
6S
5S
HEAVIER WEIGHT DENOTES WELL
OUTSIDE THE SLURRY WALL
GROUNDWATER ELEVATION (FT)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0:00:00 4/1/01
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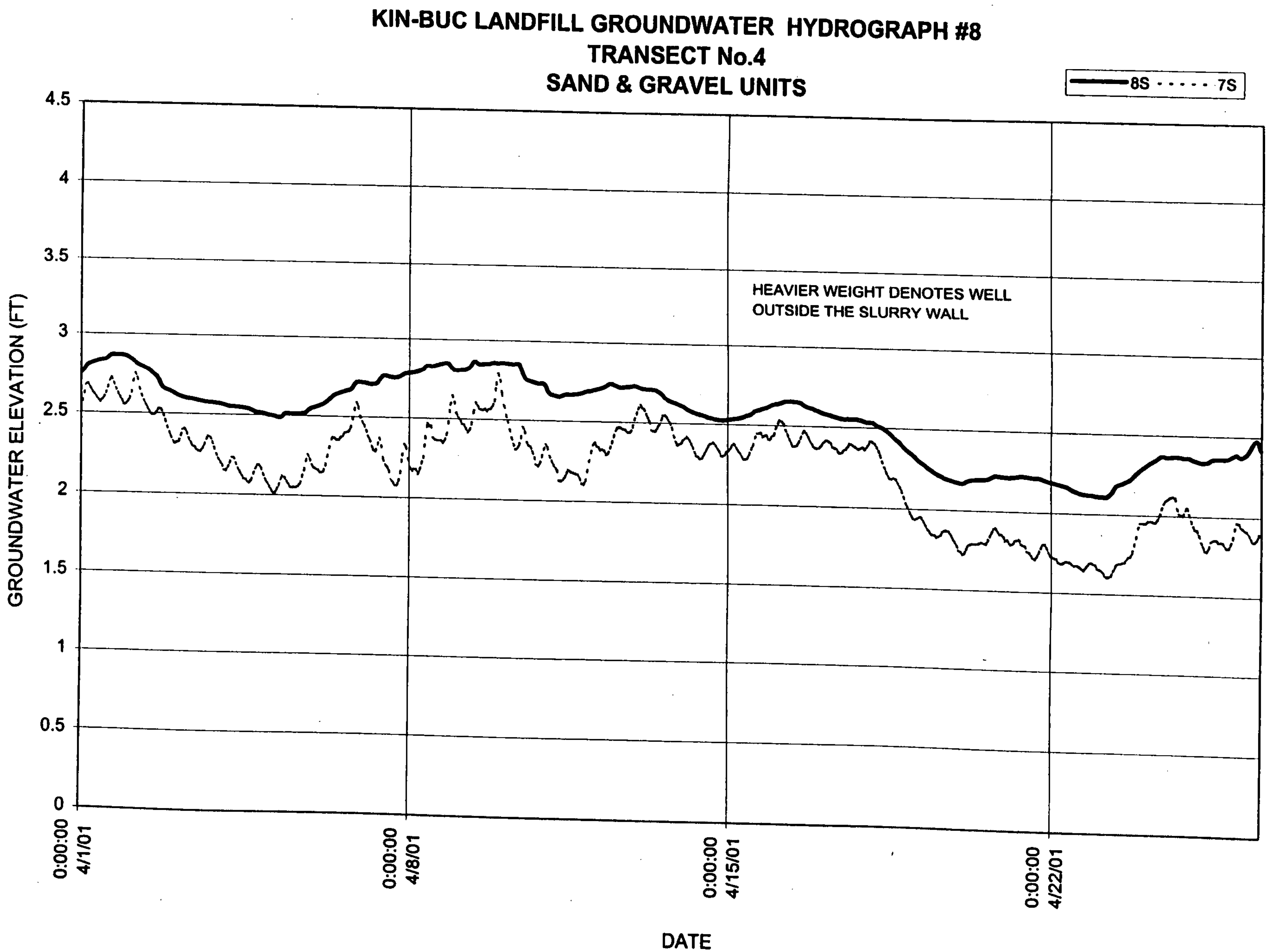
0:00:00 4/22/01
DATE



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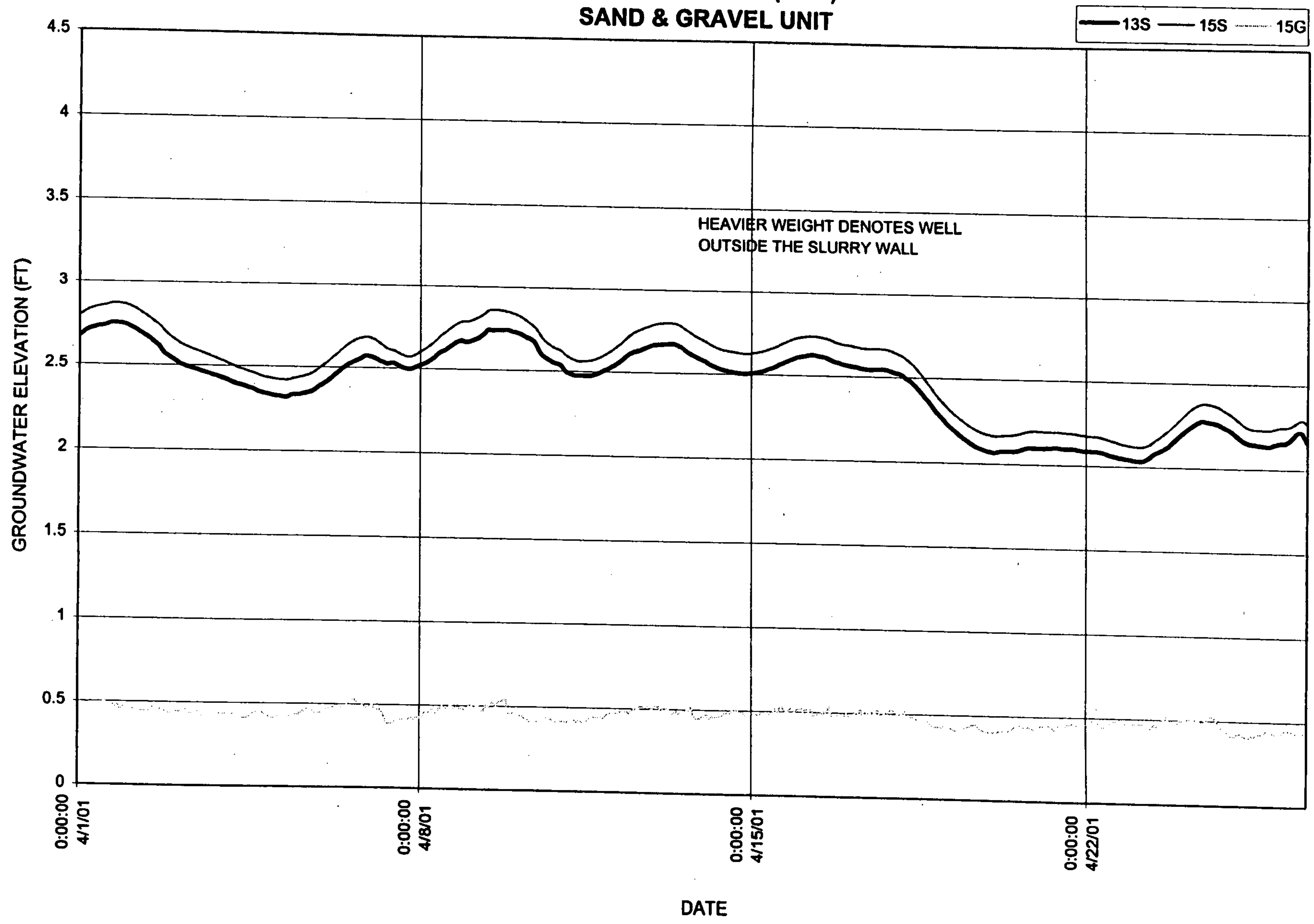
TRANSECT No.4 (OSA)
SAND & GRAVEL UNIT



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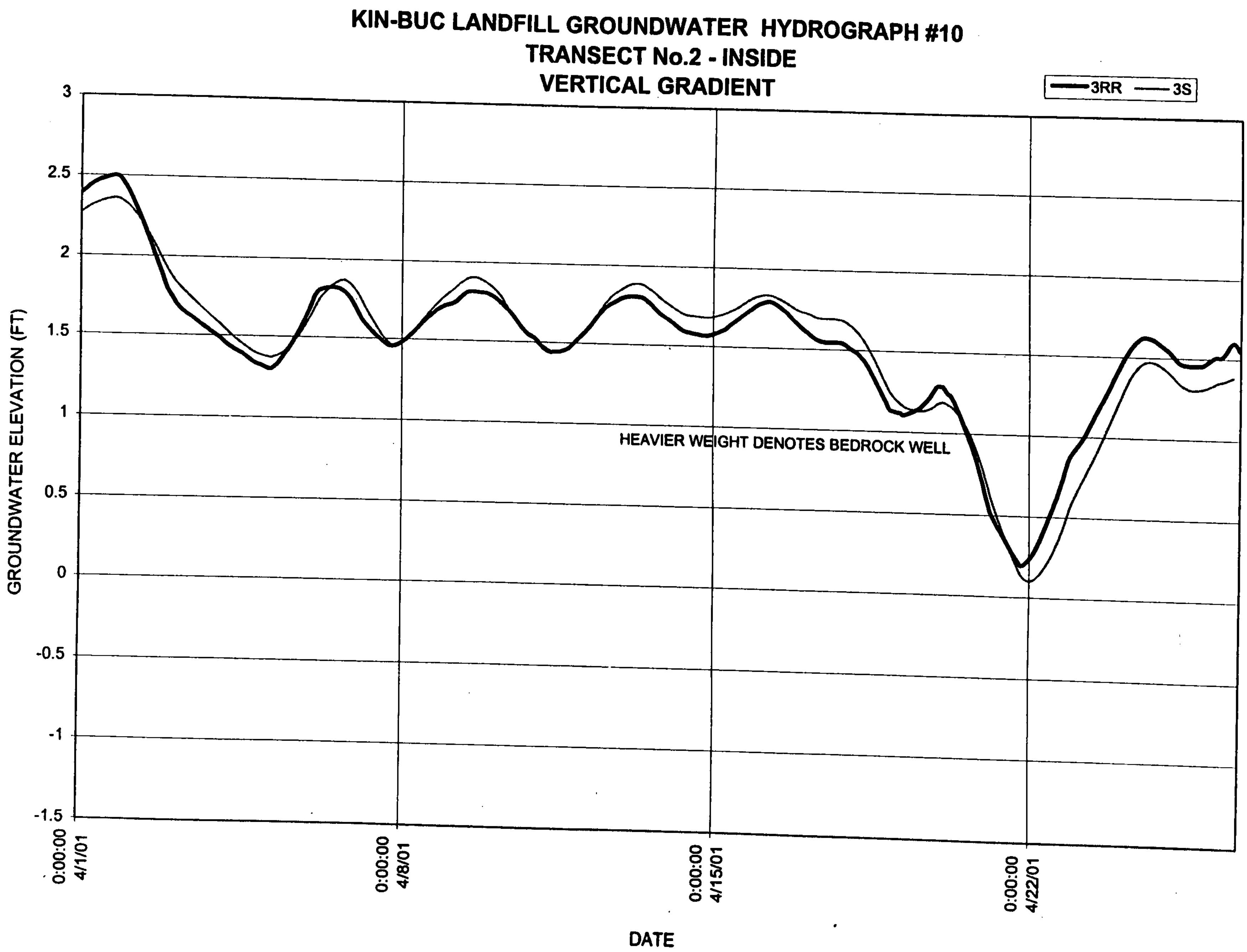
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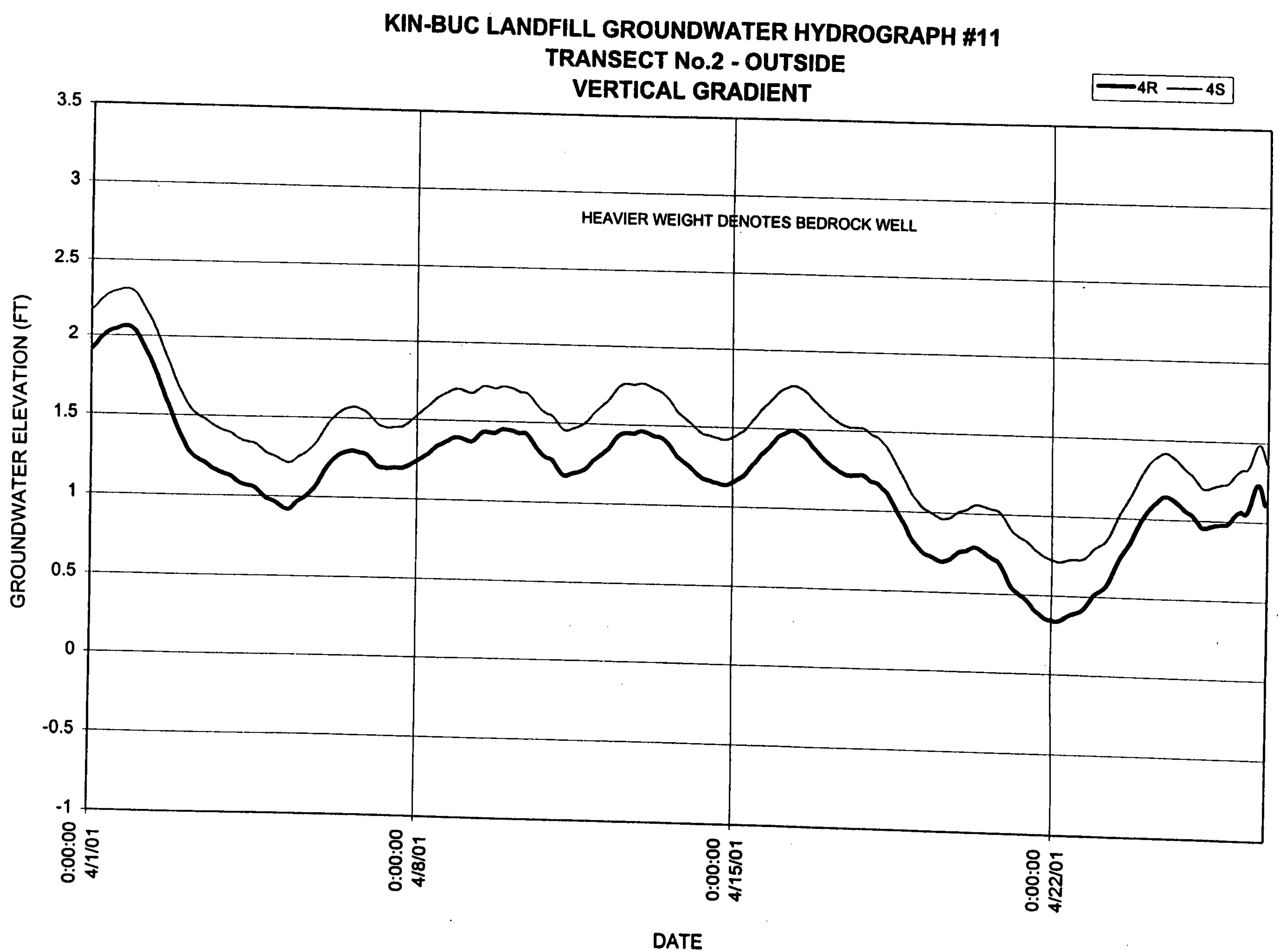
TRANSECT No.2 - INSIDE
VERTICAL GRADIENT
3RR
3S
GROUNDWATER ELEVATION (FT)
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
HEAVIER WEIGHT DENOTES BEDROCK WELL
0:00:00 4/1/01
0:00:00 4/8/01
0:00:00 4/15/01
0:00:00 4/22/01
DATE



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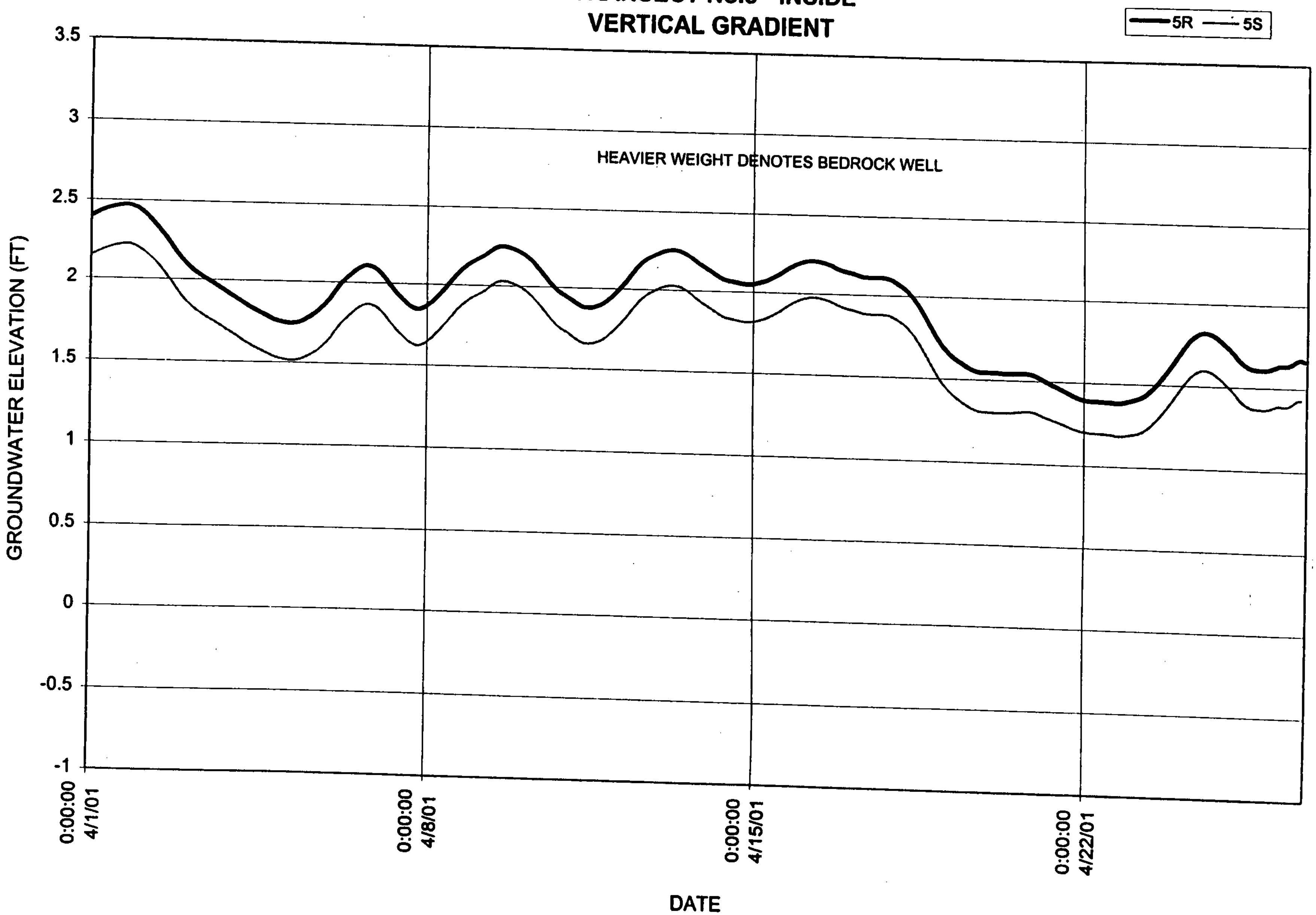
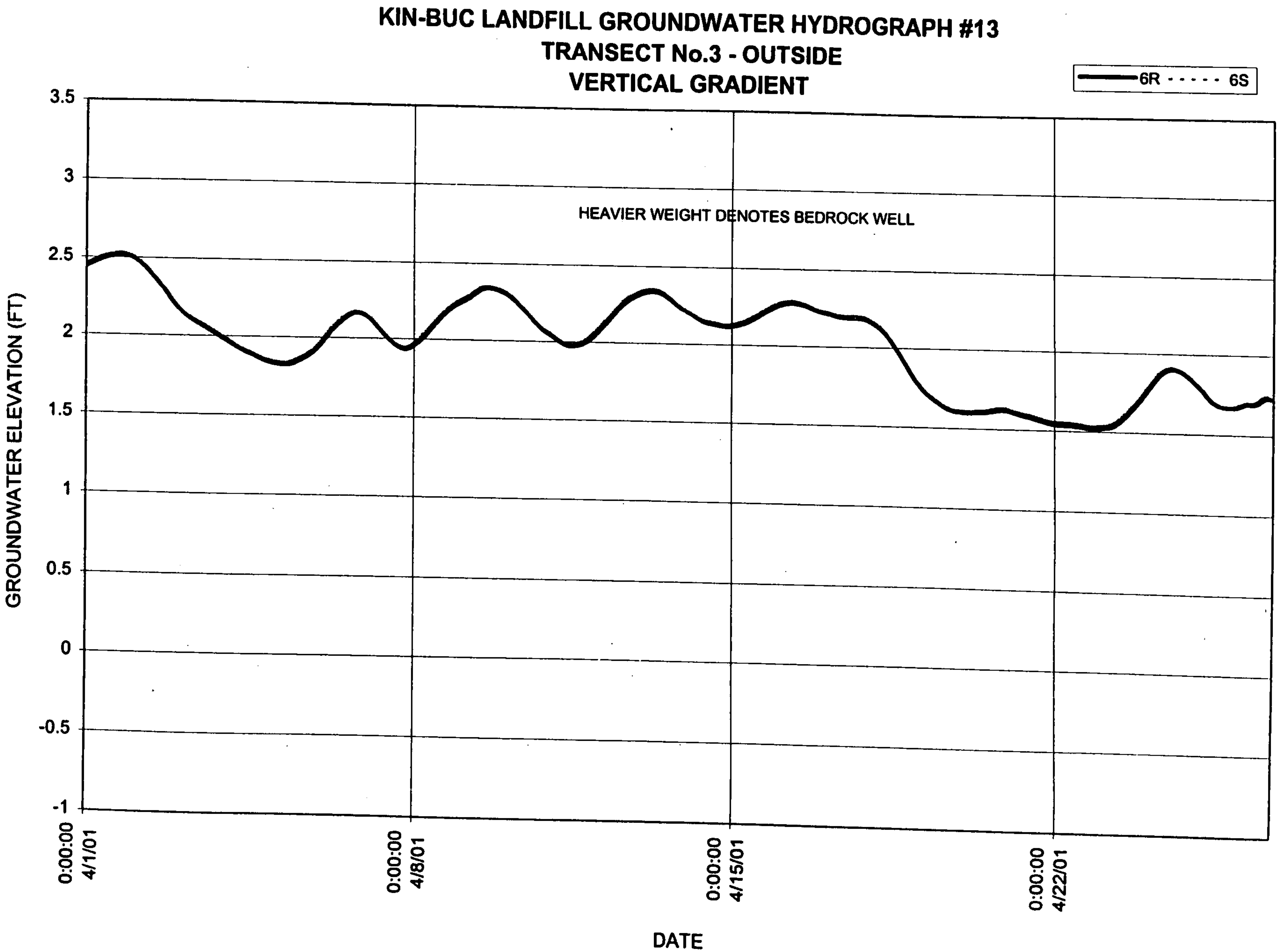
KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #12
TRANSECT No.3 - INSIDE
VERTICAL GRADIENT





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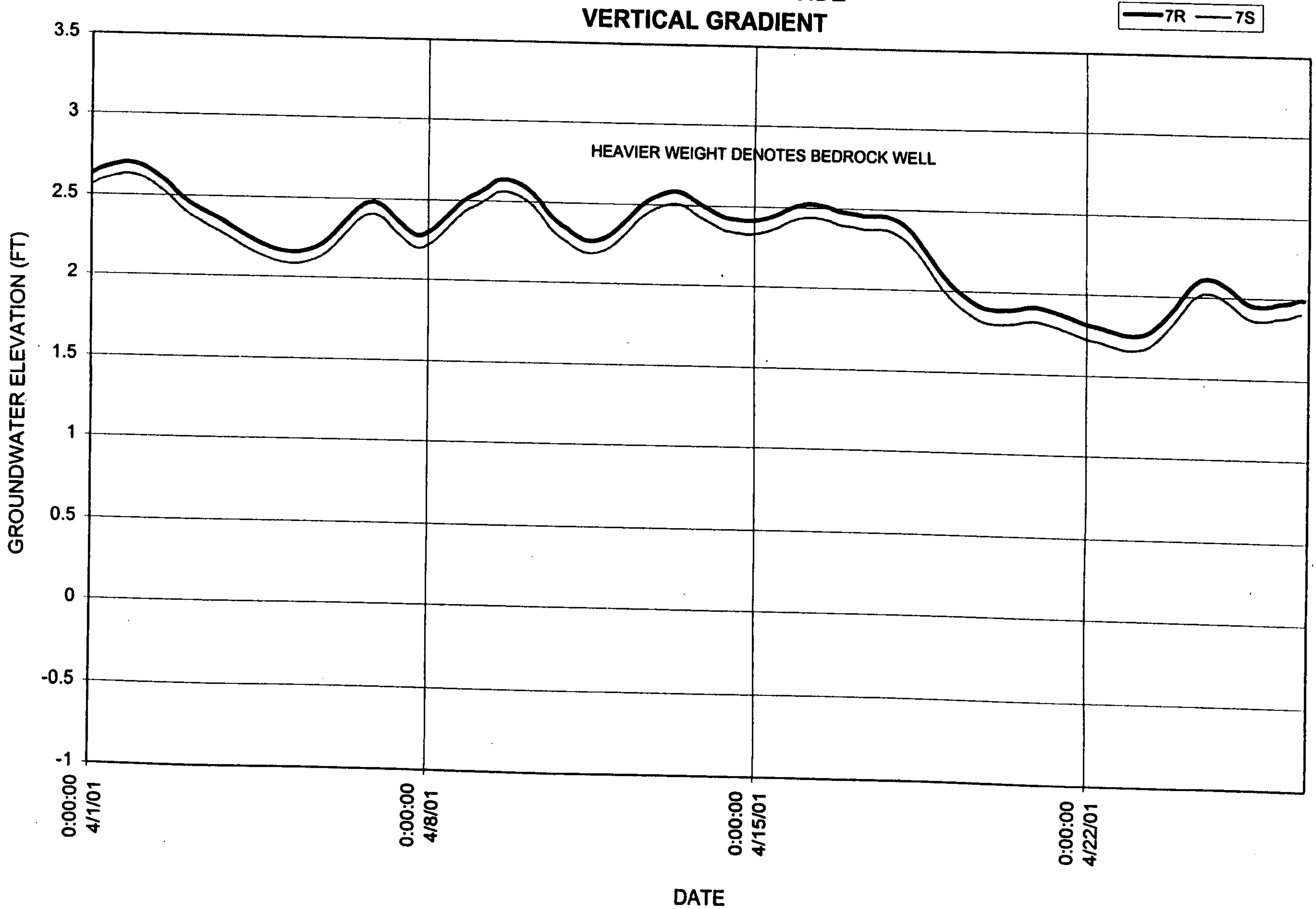
KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #14
TRANSECT No.4- INSIDE
VERTICAL GRADIENT



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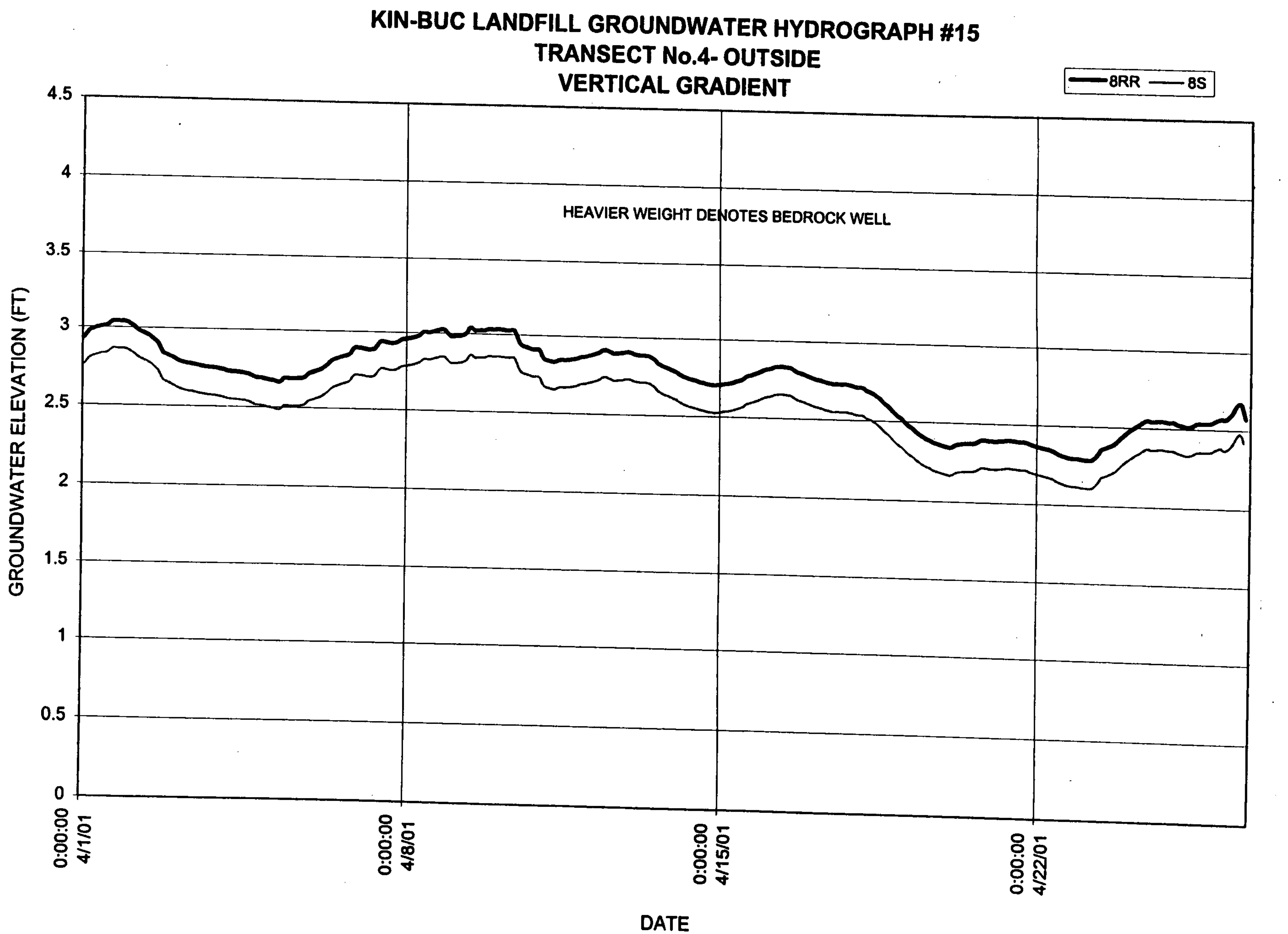

n://proj/kinbuc/15023500.000/1stqt01/april01/8rr-8s

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A Member of The IT Group

the IT group

June 27, 2001
Project 791186

Mr. Carl Januszkiewicz
Waste Management, Inc.
Kin-Buc Landfill Treatment Plant
383 Meadow Road
Edison, NJ 08817

Re: Hydraulic Monitoring for May 2001

Dear Mr. Januszkiewicz:

A site visit was completed on June 7, 2001 to download water level recorder data and obtain manual water level measurements. The following is an update of the hydraulic monitoring for the month of May 2001 at the Kin-Buc Landfill. This information is to be included in the quarterly report, which is to be submitted to the EPA in mid-August.

The minimum, maximum, and average water elevations recorded at each well are included in Table 1. Water level elevations were compared with manual readings indicating that the Trolls are functioning properly and are recording accurate data. Attachment 1 shows the hydrographs for each of the transect locations.

The water levels in wells on the outside of the slurry wall vary significantly over the course of the day due to the tidal influence at the site. For clarity, Hydrographs 6 through 15 show the average water level in the well over a 24-hour period (12 hours before and 12 hours after).

Transect 1

Refuse (1G/2G)/Hydrograph #1 - Intragradient conditions were maintained throughout the month.

Transect 2

Refuse (3G/4G)/Hydrograph #2 - Intragradient conditions were maintained throughout the month.

Sand and Gravel (3S/4S)/Hydrograph #6 - Intragradient conditions were not consistently observed during the month. Water levels in Well 3S (inside) ranged from approximately -0.34 to 1.95 feet msl, with a monthly average of .87 feet msl. Water levels in Well 4S (outside) ranged from approximately 0.28 to 2.37 feet msl, with a monthly average of 1.26 feet msl. Intragradient conditions were maintained during the last two weeks of the month which correlates to increased groundwater extraction rates.

Vertical Gradient (3S/3RR)-Inside/Hydrograph #10 – Upward gradient conditions were not consistently maintained between the bedrock and overlying sand & gravel units inside the slurry wall. The average monthly water elevation for Well 3S (sand & gravel) and 3RR (bedrock) was 0.87 and 0.98 feet msl, respectively.

Vertical Gradient (4S/4R)-Outside/Hydrograph #11 – The vertical gradient between the bedrock and overlying sand & gravel units was in a downward direction. The average monthly water elevation for Well 4S (sand & gravel) and 4R (bedrock) was 1.26 and 1.00 feet msl, respectively.

Transect 3

Refuse (5G/6G)/Hydrograph #3 – Intragradient conditions were maintained throughout the month.

Sand and Gravel (5S/6S)/Hydrograph #7 - Intragradient conditions were maintained throughout the month.

Vertical Gradient (5R/5S)-Inside/Hydrograph #12 – Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units inside the slurry wall throughout the month.

Vertical Gradient (6R/6S)-Outside/Hydrograph #13 – Upward gradient conditions were not observed between the bedrock and overlying sand & gravel units outside the slurry wall. The difference in average monthly water elevations for Well 6S (sand & gravel) and 6R (bedrock) did not indicate a dominant flow direction.

Transect 4

Refuse Oil Seeps Area (13G/15G)/Hydrograph #4 - Intragradient conditions were maintained throughout the month.

Sand and Gravel Oil Seeps Area (13S/15S)/Hydrograph #9 - Due to an upward gradient between the sand & gravel and refuse units in the oil seeps area, groundwater was not collected from the sand & gravel unit. Hydrograph 9 shows the ambient conditions between Wells W-15S (outside) and W-13S (inside) in the sand & gravel unit. Water levels from Well W-15G in the refuse unit are included on the hydrograph for comparison.

Sand and Gravel (7S/8S)/Hydrograph #8 - Intragradient conditions were maintained throughout the month.

Vertical Gradient (7R/7S)-Inside/Hydrograph #14 - Upward gradient conditions were maintaned between the bedrock and overlying sand & gravel units inside the slurry wall throughout the month.

Vertical Gradient (8RR/8S)-Outside/Hydrograph #15 - Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units outside the slurry wall throughout the month.

Transect 5

Refuse (9G/10G)/Hydrograph #5 – Intragradient conditions were maintained throughout the month.

Figure 1 shows the hydraulic profile summary for May 2001.

Groundwater and Leachate Collection

Based on data provided by U.S. Filter, the following volumes of groundwater and leachate were extracted from the sand and gravel wells and leachate collection system for the period from May 1 to May 31, 2001:

S&G #1 Groundwater	S&G #2 Groundwater	S&G #3 Groundwater	S&G #4 Groundwater	Leachate
97,570 gal.	322,886 gal.	33,145 gal.	10,752 gal.	45,661 gal.
3,147 gpd	10,416 gpd	1,069 gpd	347 gpd	1,473 gpd

For the period, a total of 464,353 gallons of groundwater was collected. The recommended rates are 10,000 gpd and 5,000 gpd from S&G Wells 2 and 3, respectively. The average groundwater extraction rate of 14,979 gpd meets the recommended extraction rate of 15,000 gpd, however the recommended extraction rate of 5,000 gpd from S&G Well 3 was not met.

The leachate extraction rate of 1,473 gpd meets the recommended rate of 1,200 gpd, and intragradient conditions were maintained in the refuse unit through out the month. Based on the hydraulic data from May 2001, it appears that the current leachate collection rate is sufficient to maintain hydraulic containment in the refuse unit.

Hydraulic monitoring of the leachate cleanouts indicated that the leachate collection system is operating properly.

CONCLUSIONS/RECOMMENDATIONS

Intragradient conditions were maintained in the refuse unit at all of the transect locations throughout the month. Leachate collection rates should be maintained at 1,200 gpd.

Intragradient conditions were maintained in the sand & gravel unit at transects 3 and 4. Intragradient conditions were not observed in the sand & gravel unit at transect 2.

Upward gradient conditions were observed between the bedrock and overlying sand & gravel unit at transect 3 inside the slurry wall and at transect 4 outside the slurry wall. Downward gradient conditions were observed between the bedrock and sand & gravel unit at transect 2 outside the slurry wall.

Upward vertical gradients were not consistently maintained between the bedrock and sand and gravel at transect 2 inside the slurry wall (Wells 3RR/3S). However, the last two weeks of the month show an upward vertical gradient at this location due to an increase in groundwater extraction rates. The recommended extraction rates for S&G Wells 2 and 3 are 10,000 gpd and 5,000 gpd, respectively.

We trust you find this information useful. If you have any questions, please do not hesitate to contact us.

Sincerely,

IT CORPORATION

Steven Goldberg, Ph.D, CPG
Senior Hydrogeologist

Thomas Connors, P.E.
Project Manager

Attachments

cc: Glenn Grieb, US Filter

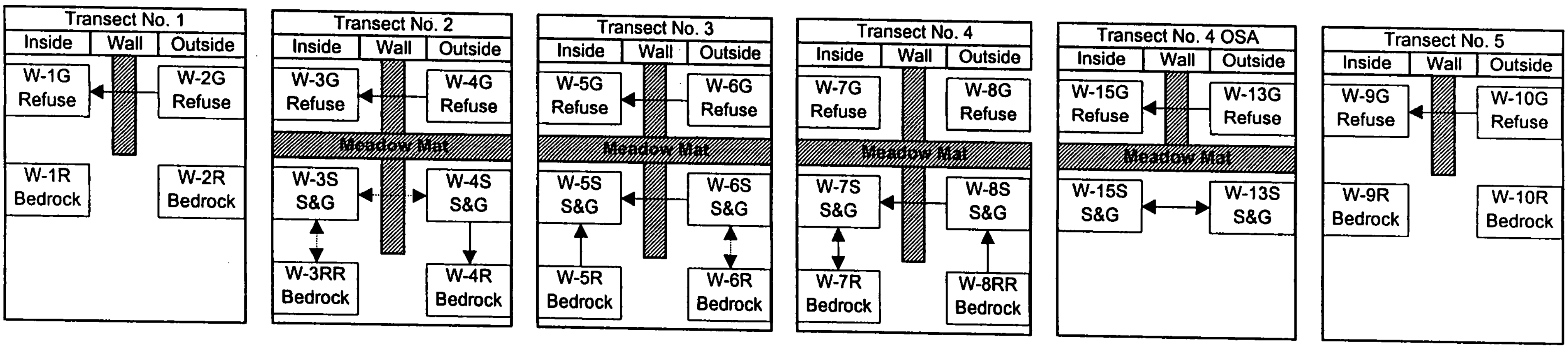
Table 1
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

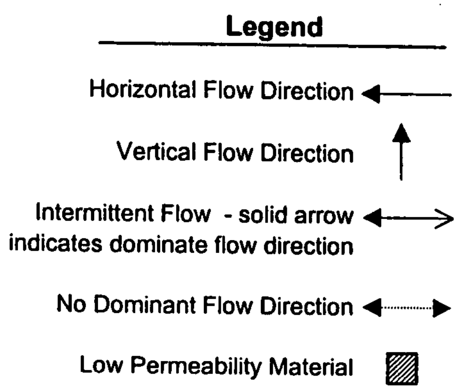
Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Period	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Period	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-1G	April	11.09	11.23	11.17	W-2G	April	12.94	14.61	13.70
	May	11.09	11.22	11.19		May	11.88	13.09	12.75
	June					June			
	April-May	11.09	11.23	11.17		April-May	11.88	14.61	13.22
W-3G	April	10.23	10.97	10.71	W-4G	April	11.07	11.71	11.42
	May	10.29	10.92	10.65		May	10.79	11.28	11.04
	June					June			
	April-May	10.23	10.97	10.68		April-May	10.79	11.71	11.23
W-3S	April	-0.13	2.44	1.40	W-4S	April	-0.03	2.87	1.39
	May	-0.34	1.95	0.87		May	0.28	2.37	1.26
	June					June			
	April-May	-0.34	2.44	1.13		April-May	-0.03	2.87	1.32
W-5G	April	10.23	11.16	10.69	W-6G	April	12.84	13.93	13.37
	May	10.27	11.12	10.69		May	12.56	13.48	13.00
	June					June			
	April-May	10.23	11.16	10.69		April-May	12.56	13.93	13.18
W-5S	April	0.97	2.33	1.65	W-6S	April	1.29	2.65	1.97
	May	0.97	1.94	1.45		May	1.36	2.26	1.79
	June					June			
	April-May	0.97	2.33	1.55		April-May	1.29	2.65	1.88
W-7S	April	1.58	2.79	2.16	W-8S	April	1.84	4.17	2.52
	May	1.44	2.36	1.93		May	1.91	4.08	2.46
	June					June			
	April-May	1.44	2.79	2.04		April-May	1.84	4.17	2.49
W-15S	April	2.00	3.28	2.50	W-13S	April	1.85	3.47	2.40
	May	1.99	2.99	2.39		May	1.87	3.20	2.30
	June					June			
	April-May	1.99	3.28	2.44		April-May	1.85	3.47	2.35
W-15G	April	0.35	0.55	0.46	W-13G	April	6.32	7.07	6.76
	May	0.39	0.55	0.48		May	6.20	6.93	6.62
	June					June			
	April-May	0.35	0.55	0.48		April-May	6.20	7.07	6.68
W-9G	April	7.16	7.94	7.51	W-10G	April	8.30	8.54	8.41
	May	7.12	7.77	7.45		May	8.19	8.33	8.24
	June					June			
	April-May	7.12	7.94	7.48		April-May	8.19	8.54	8.33

Table 1
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-3RR	April	-0.33	2.79	1.40	W-4R	April	-0.52	2.69	1.09
	May	-0.27	2.22	0.98		May	-0.21	2.20	0.92
	June					June			
	April-May	-0.33	2.79	1.19		April-May	-0.52	2.69	1.00
W-5R	April	1.18	2.57	1.88	W-6R	April	1.29	2.63	1.96
	May	1.06	2.16	1.63		May	1.35	2.24	1.78
	June					June			
	April-May	1.06	2.57	1.75		April-May	1.35	2.63	1.87
W-7R	April	1.69	2.86	2.24	W-8RR	April	2.02	4.36	2.70
	May	1.55	2.45	2.03		May	2.07	4.24	2.63
	June					June			
	April-May	1.55	2.86	2.13		April-May	2.02	4.36	2.66

Figure 1
Kin-Buc Landfill
May Hydraulic Profile Summary





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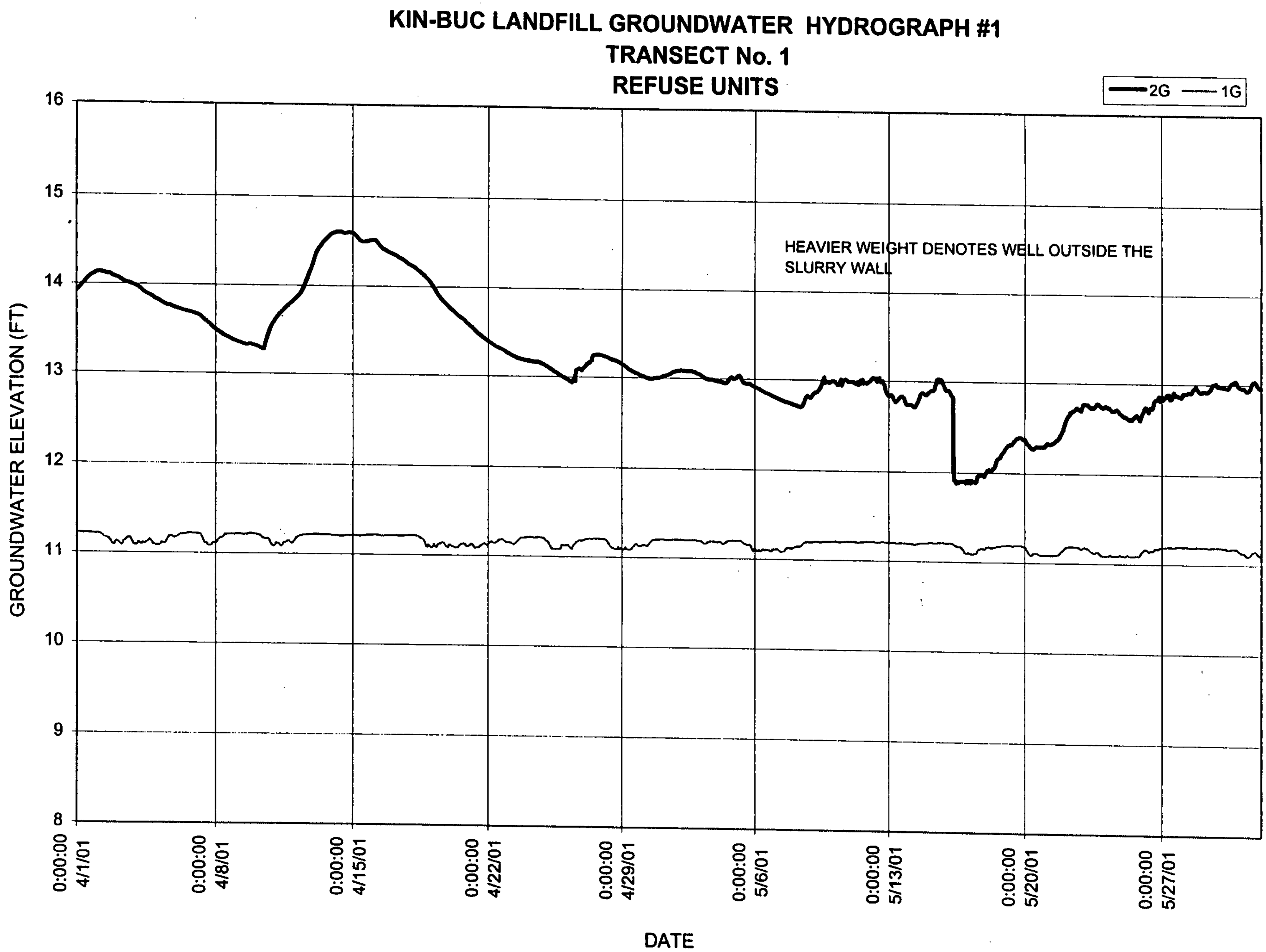

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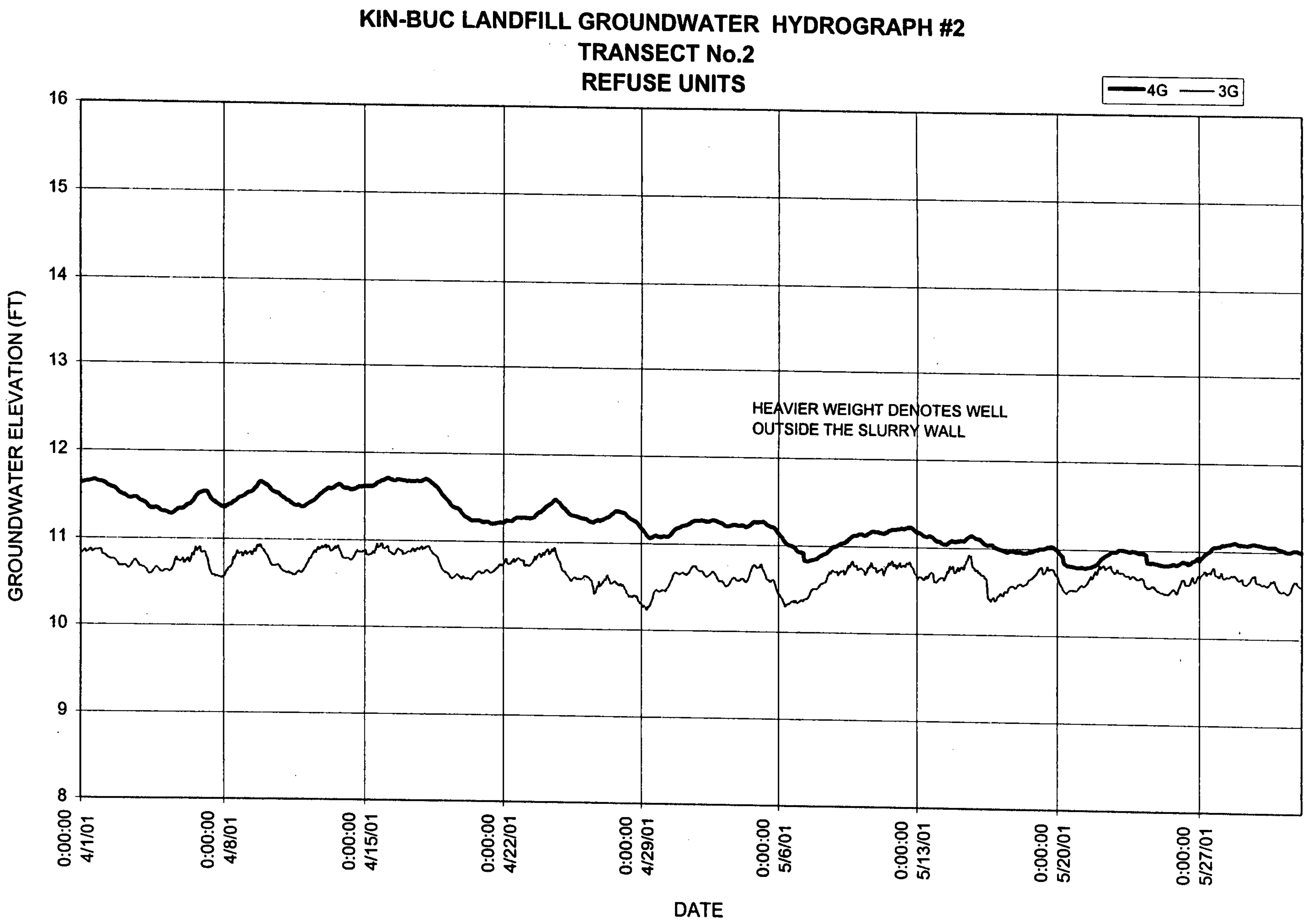

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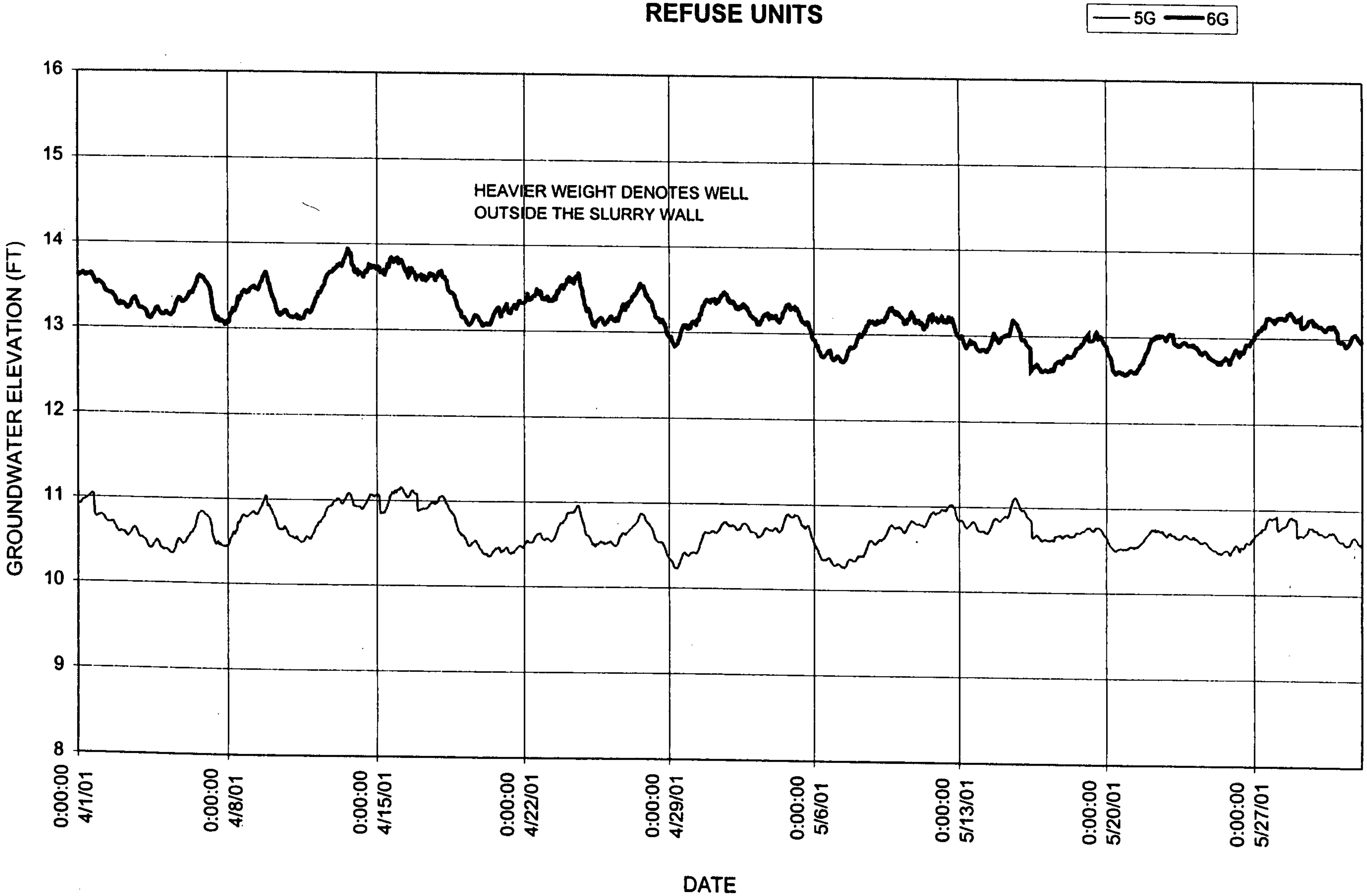
KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH # 3
TRANSECT No.3
REFUSE UNITS



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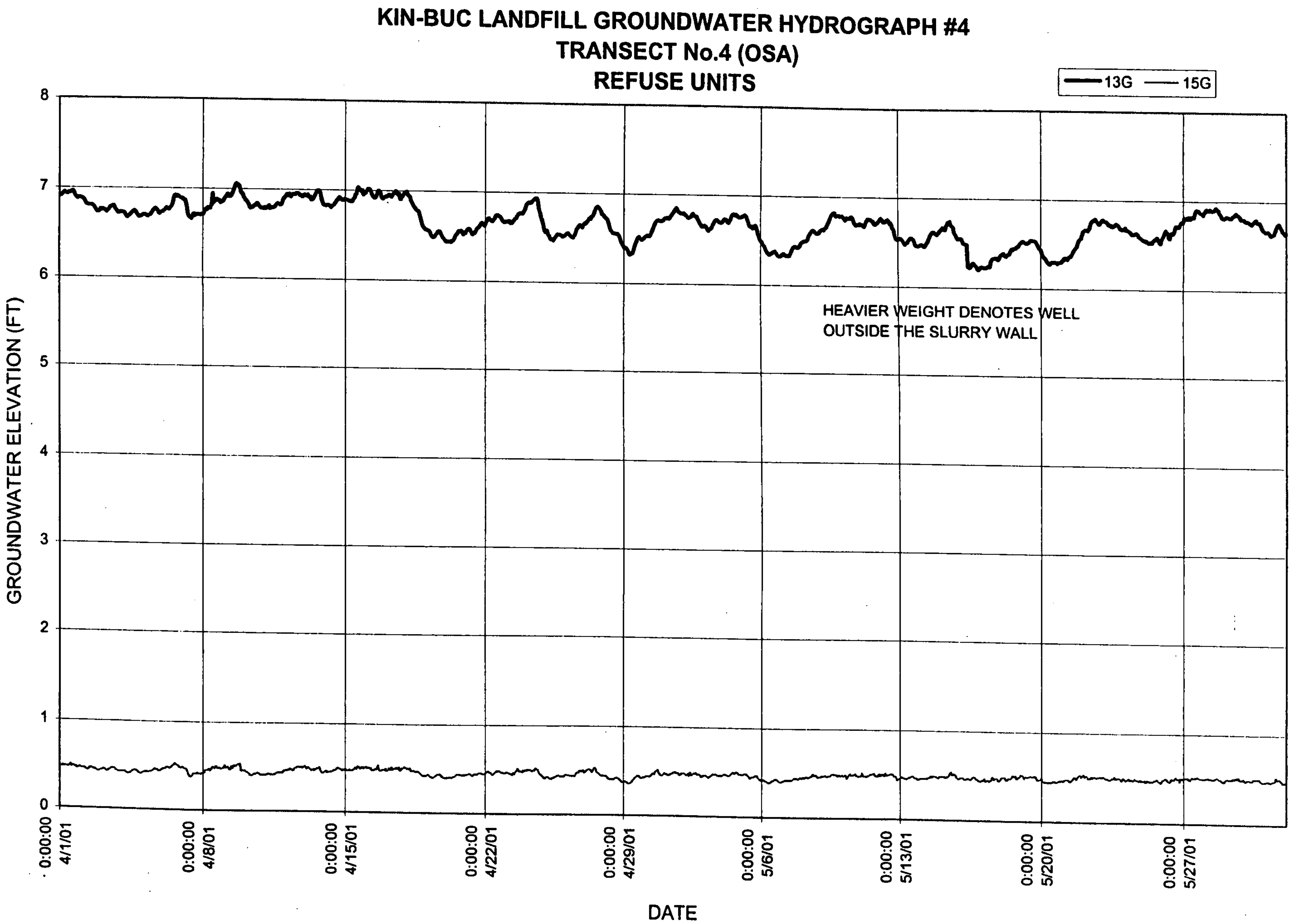

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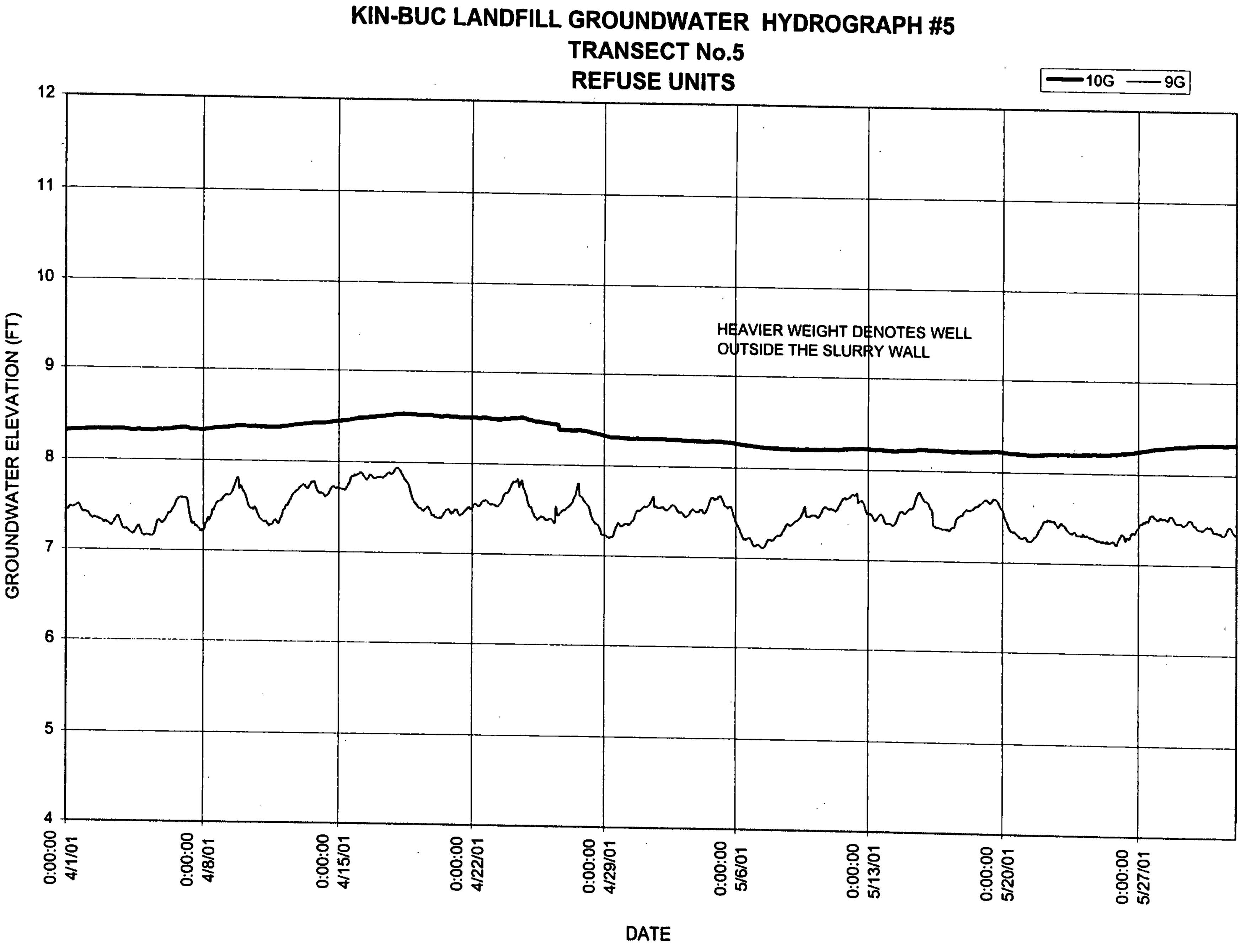

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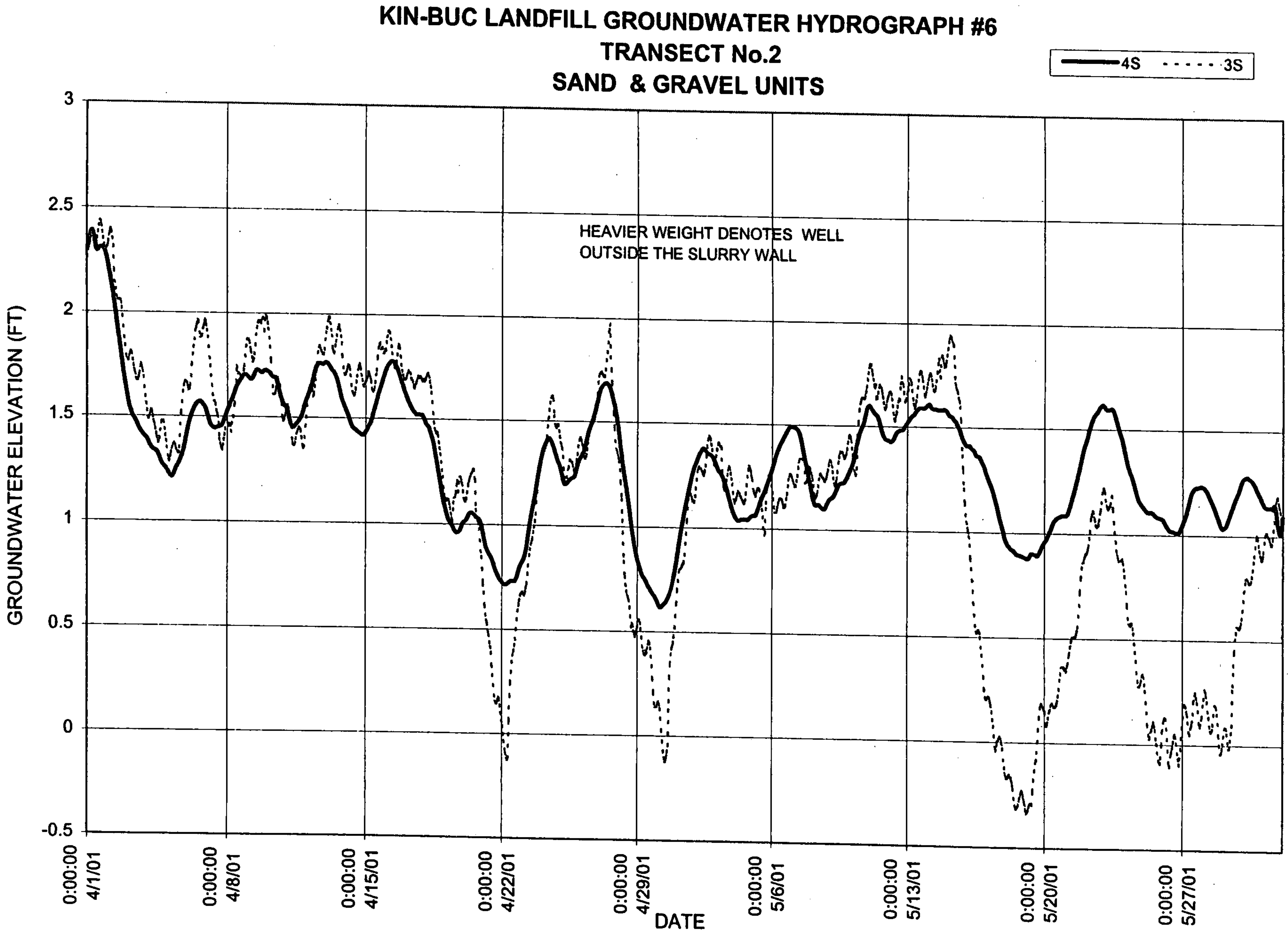

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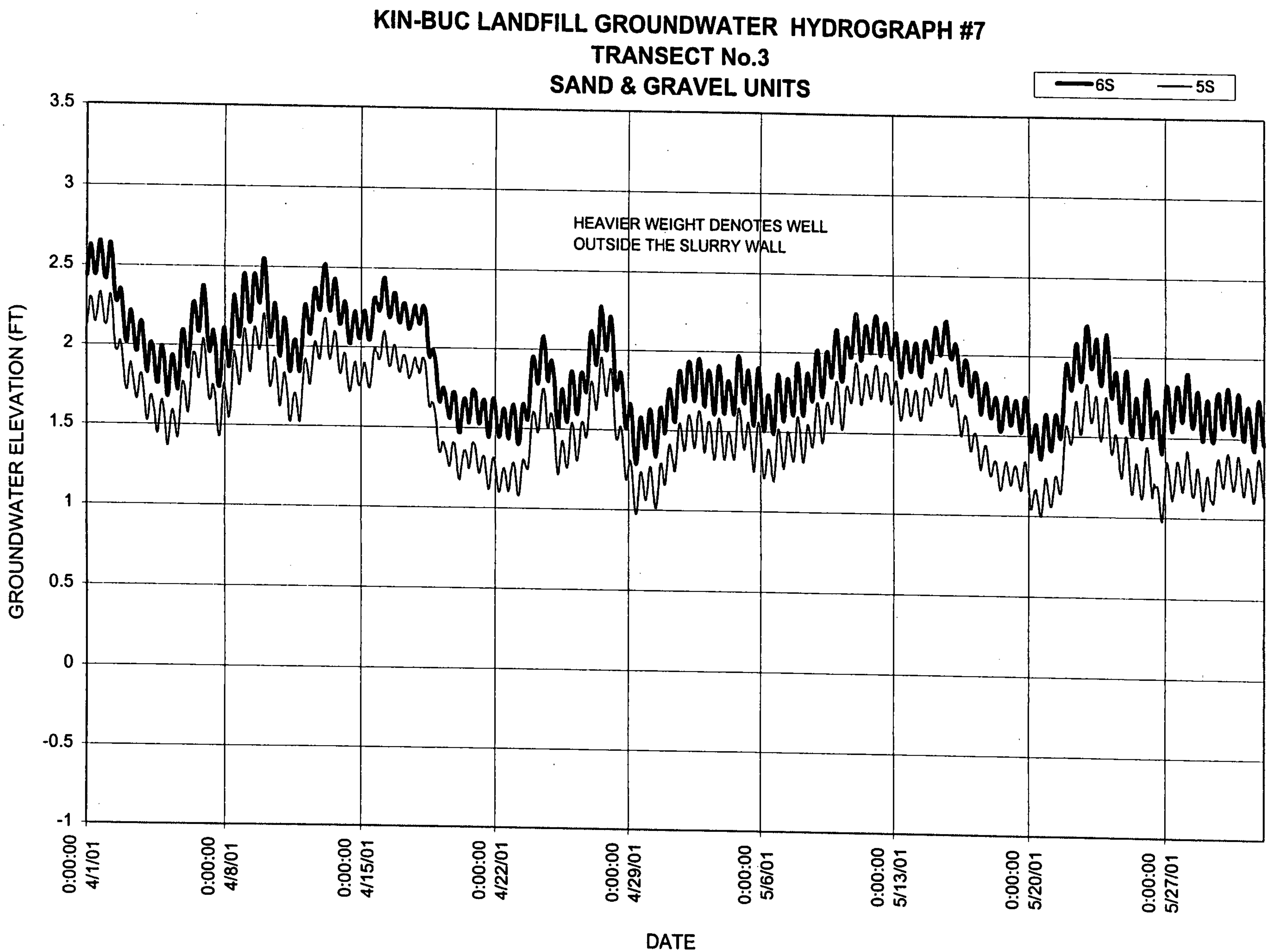

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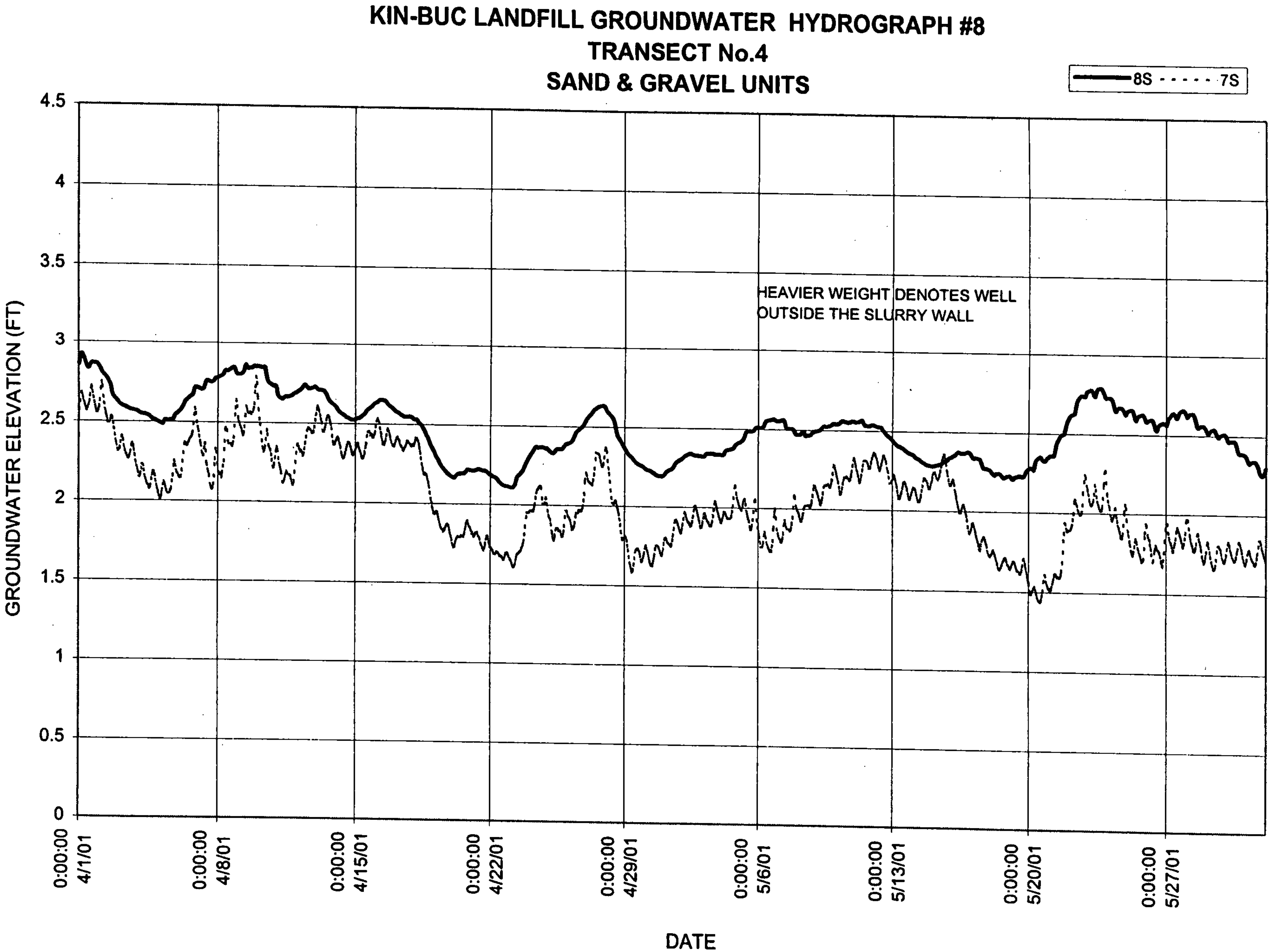

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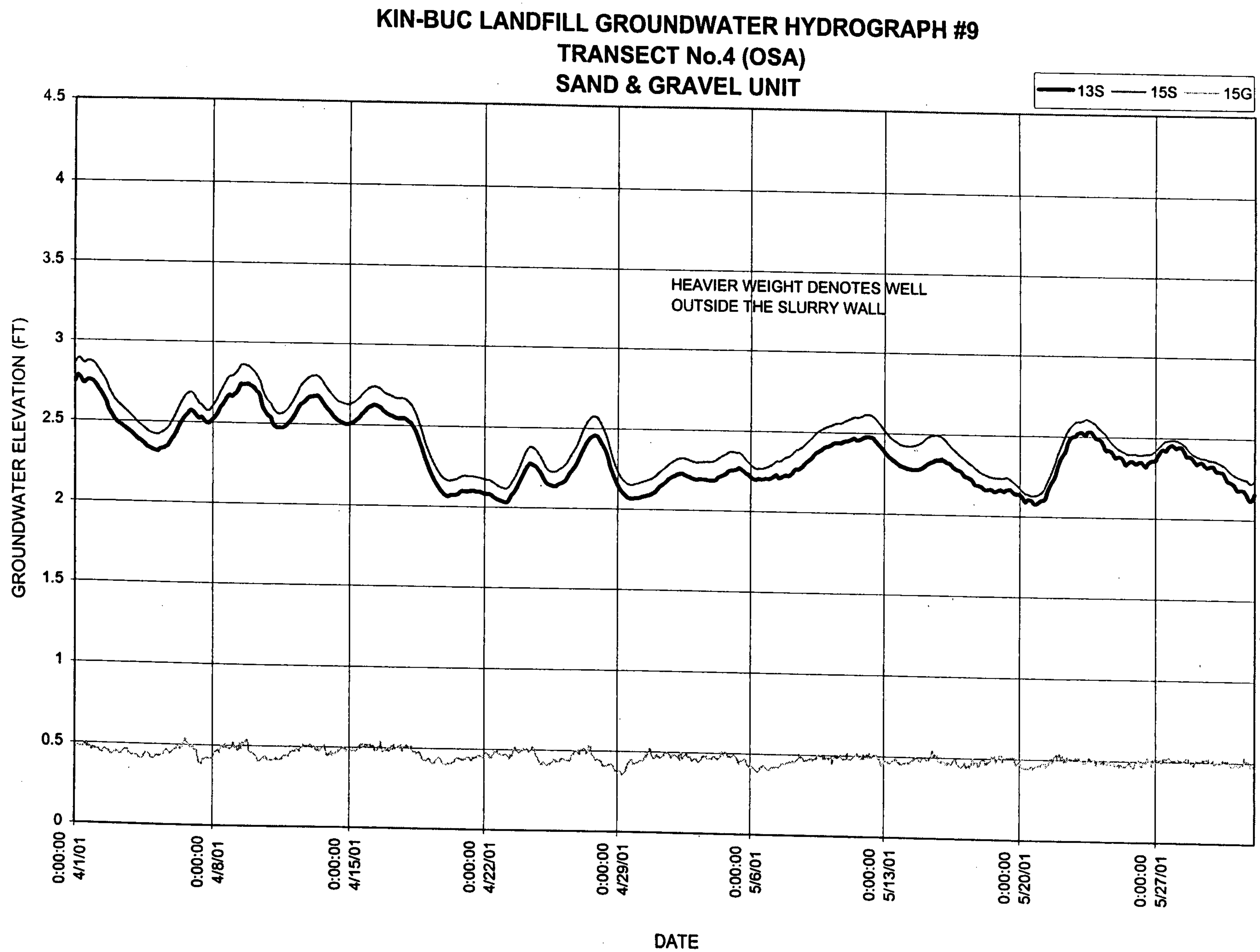

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KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #10
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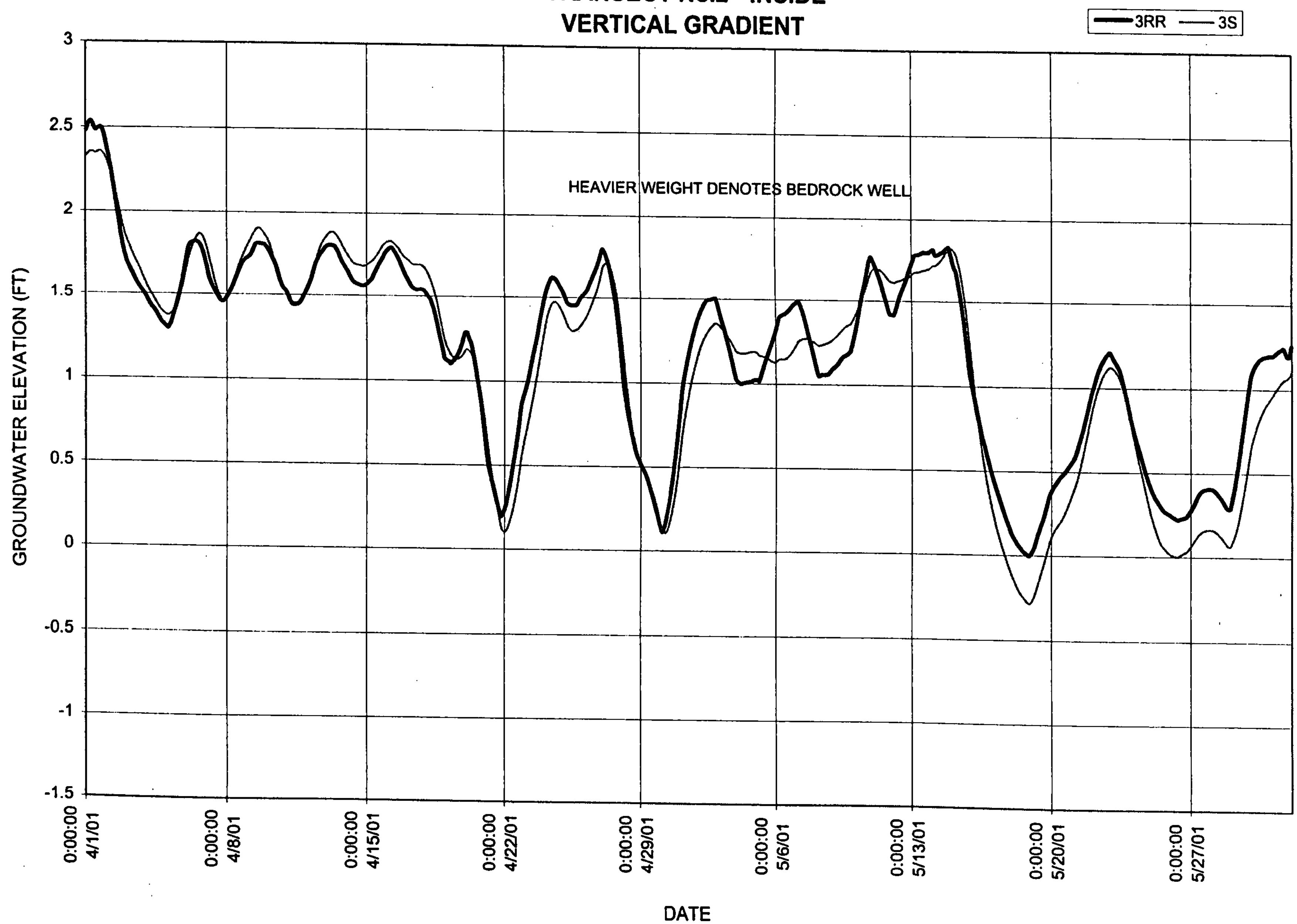

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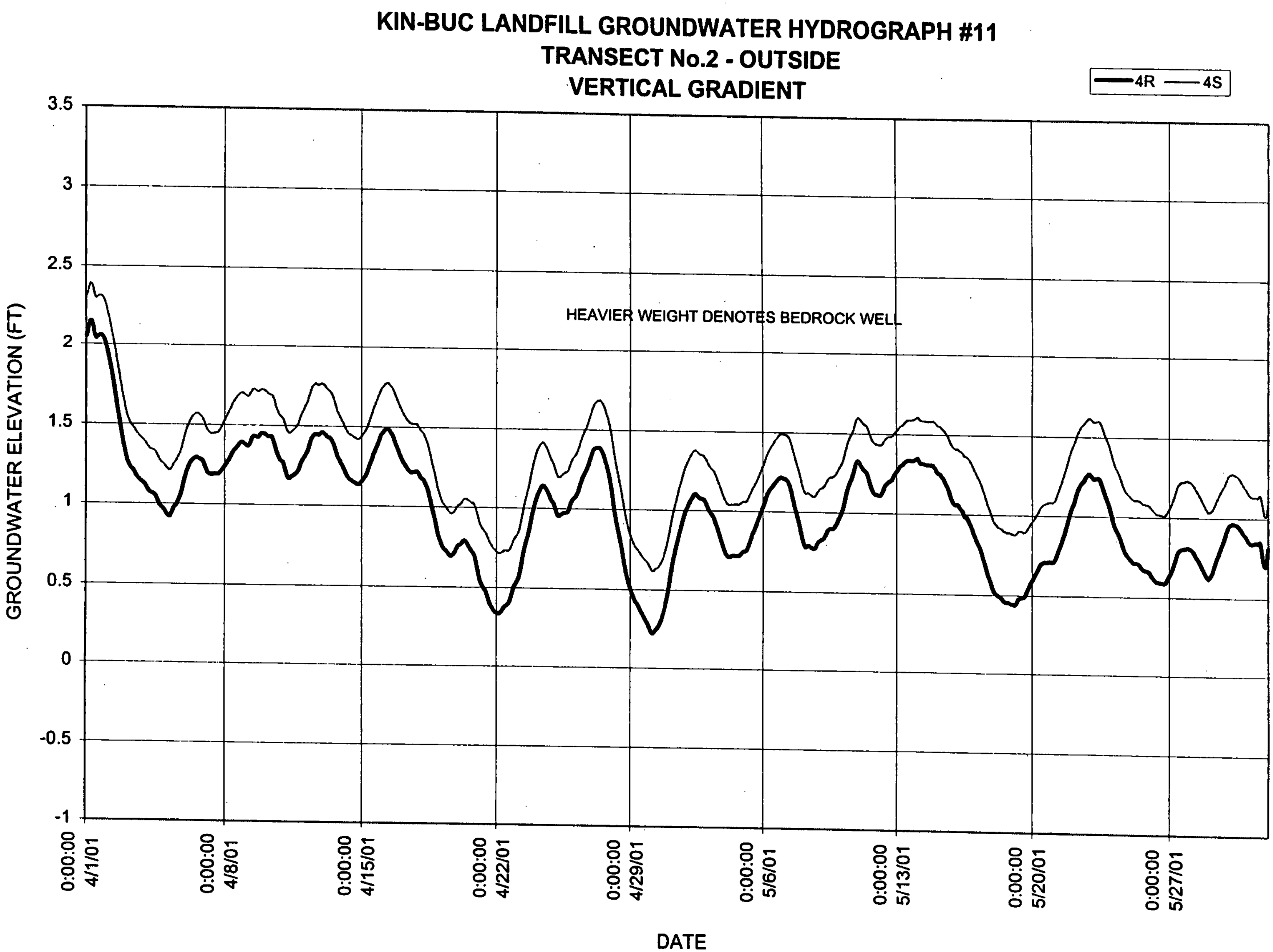

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KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #12
TRANSECT No.3 - INSIDE
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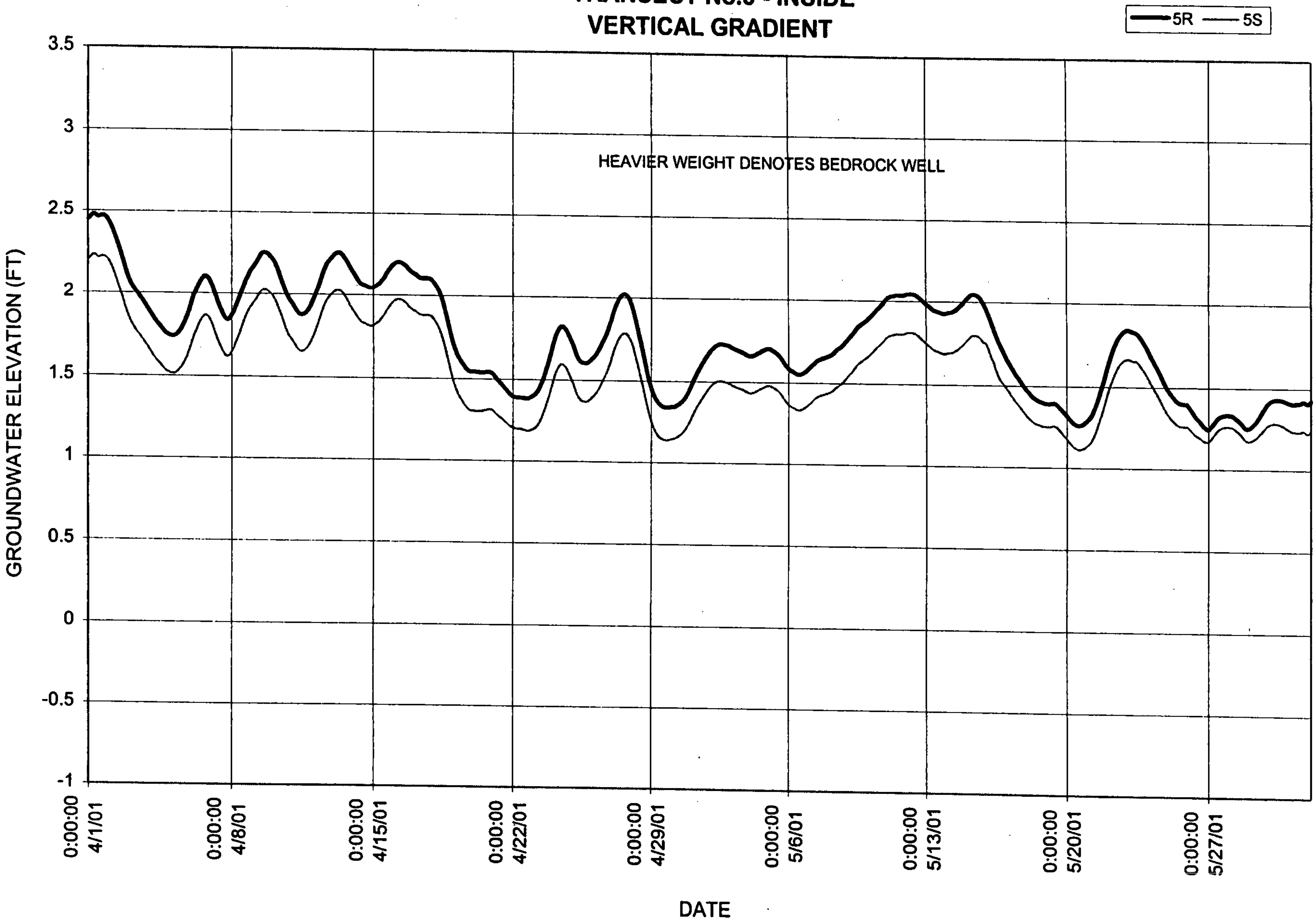

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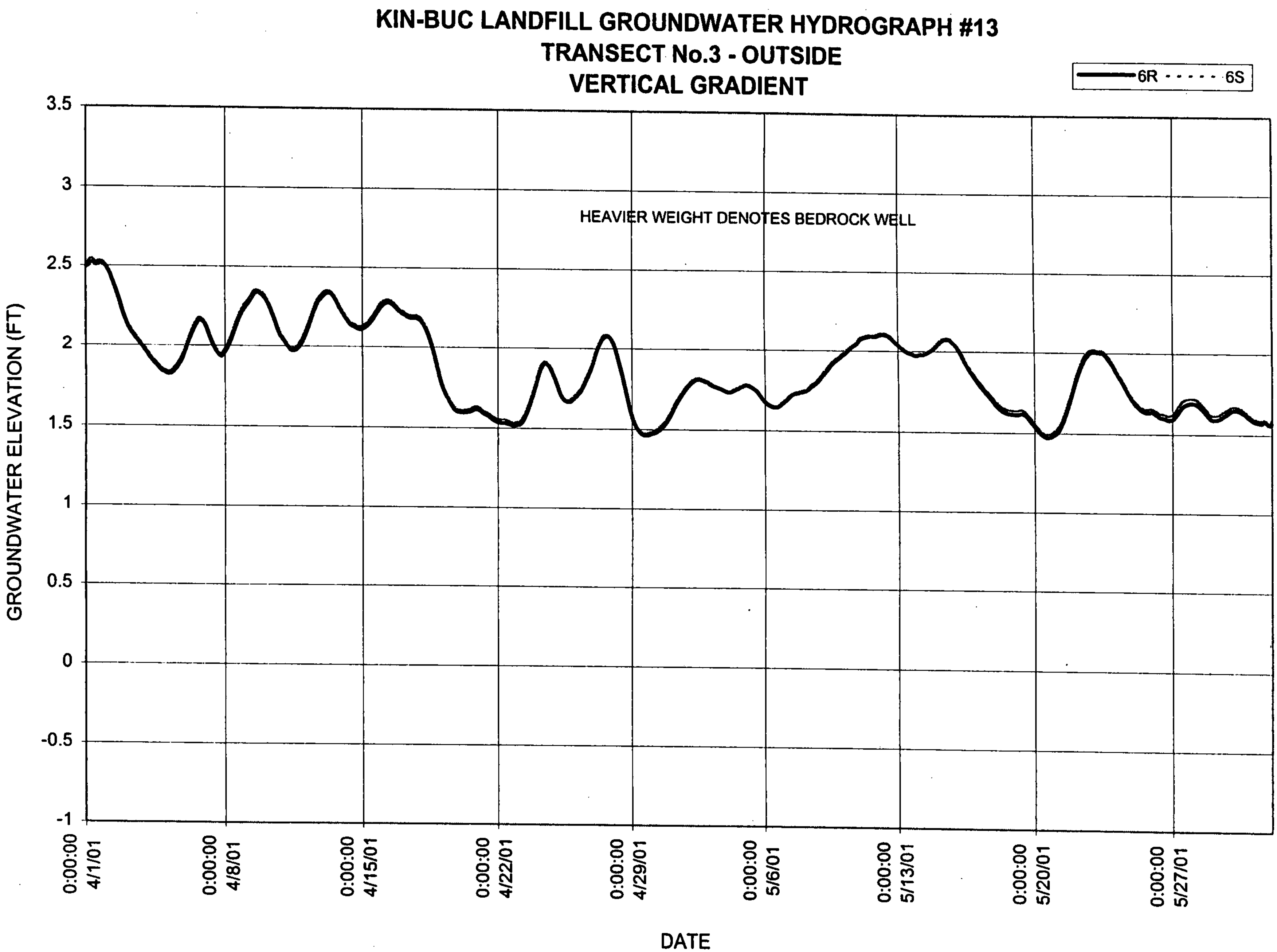

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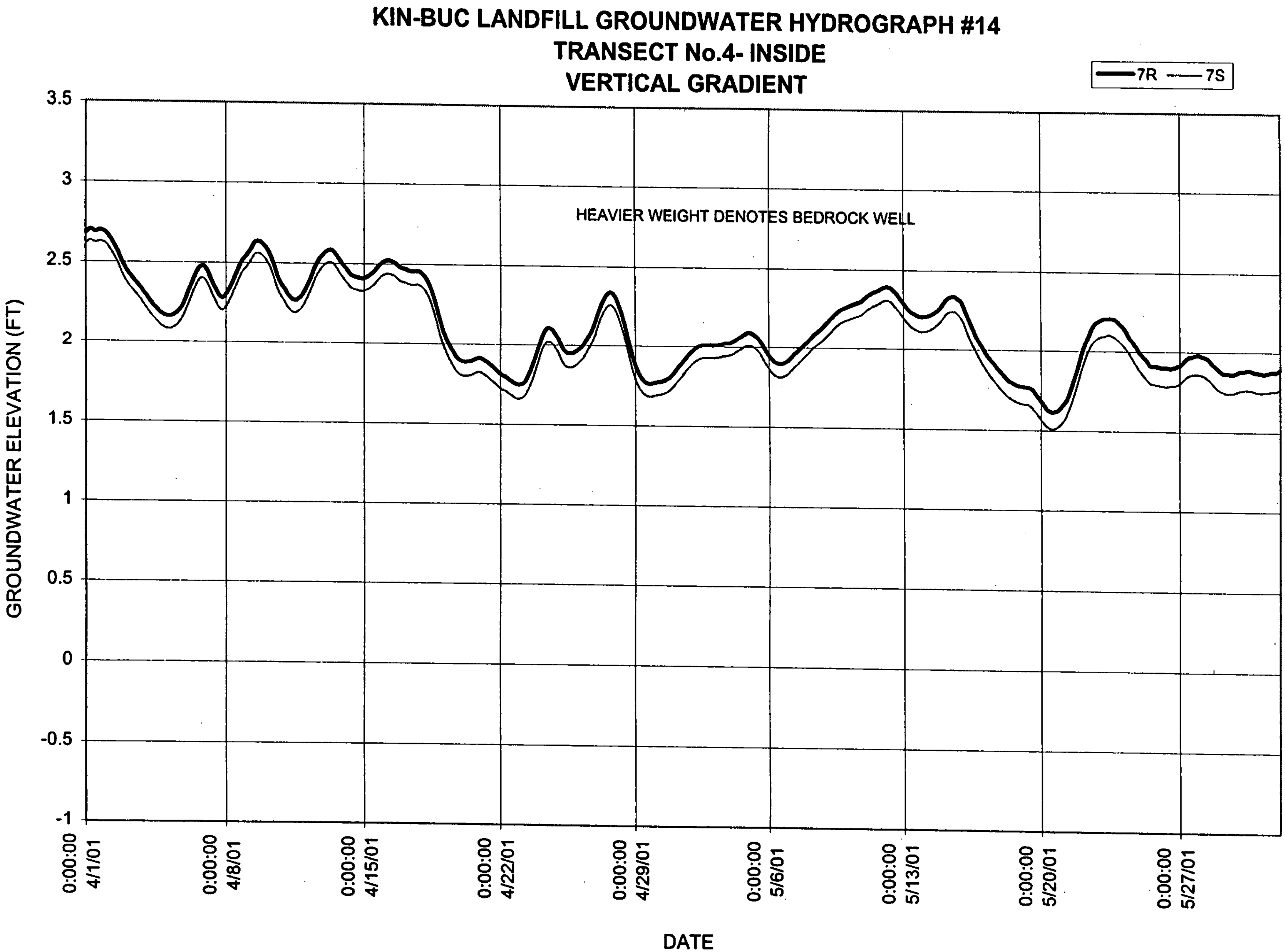

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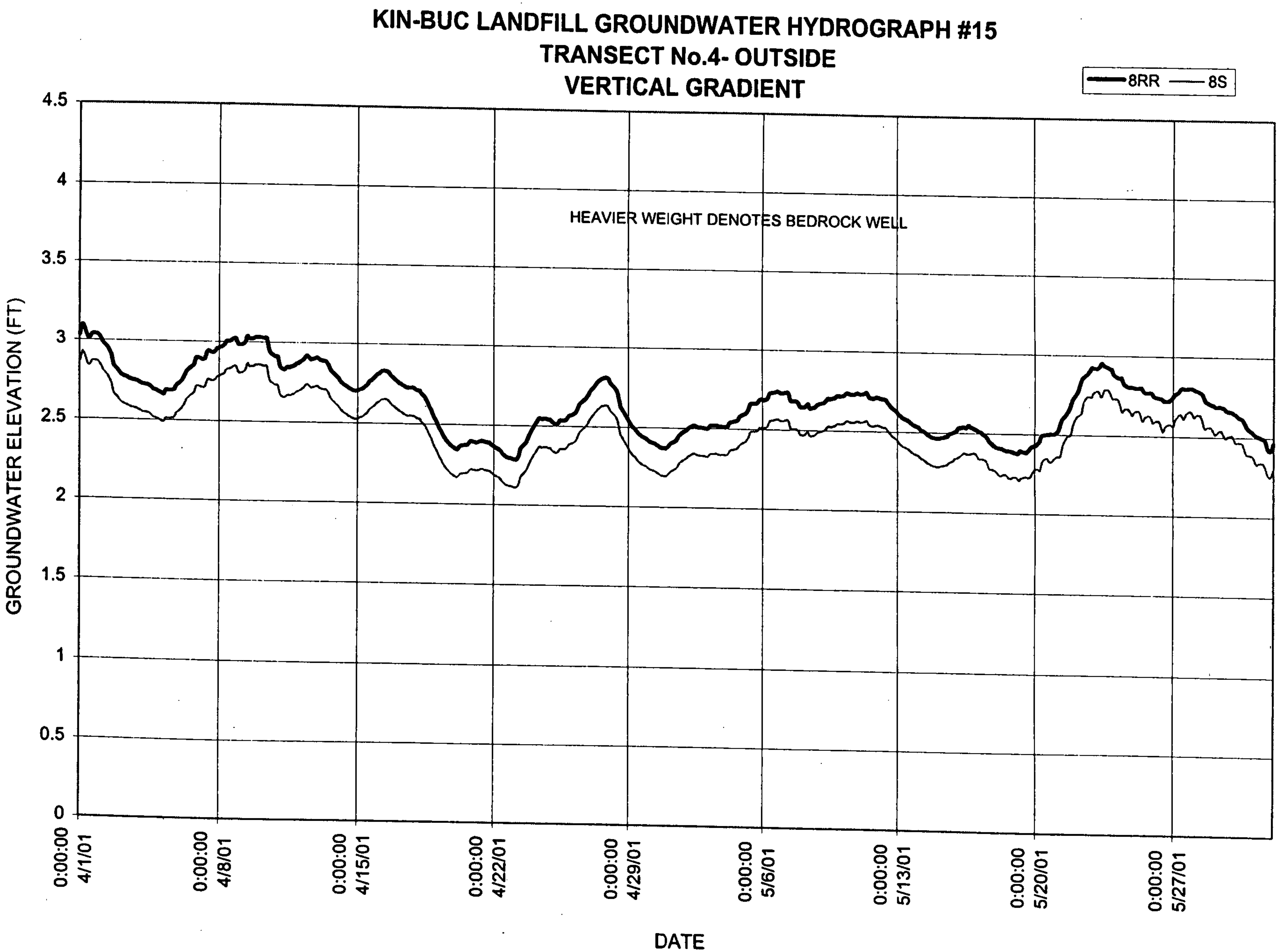

n://proj/kinbuc/15023500.000/1stqt01/may2001/8rr-8s

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A Member of The IT Group

July 25, 2001
Project 791186

Mr. Carl Januszkiewicz
Waste Management, Inc.
Kin-Buc Landfill Treatment Plant
383 Meadow Road
Edison, NJ 08817

Re: Hydraulic Monitoring for June 2001

Dear Mr. Januszkiewicz:

A site visit was completed on July 5, 2001 to download water level recorder data and obtain manual water level measurements. The following is an update of the hydraulic monitoring for the month of June 2001 at the Kin-Buc Landfill. This information is to be included in the quarterly report, which is to be submitted to the EPA in mid-August.

The minimum, maximum, and average water elevations recorded at each well are included in Table 1. The continuous water level elevation data was compared with manual readings indicating that the Trolls are functioning properly and are recording accurate data. Hydrographs have been prepared for each of the transect locations and are enclosed for your reference.

The water levels in wells on the outside of the slurry wall vary significantly over the course of the day due to the tidal influence at the site. For clarity, Hydrograph #6 through #15 show the average water level in the well over a 24-hour period (12 hours before, and 12 hours after).

Transect 1

Refuse (1G/2G)/Hydrograph #1 - Intragradient conditions were maintained throughout the month. Water levels increased in Well 1G by approximately 1 foot from June 3 to June 10. Water level elevation measurements were taken from the Leachate Collection Cleanouts #14 through #16, and are included in Table 2. These measurements indicate that the leachate collection system is functioning properly.

Transect 2

Refuse (3G/4G)/Hydrograph #2 - Intragradient conditions were maintained throughout the month.

Sand and Gravel (3S/4S)/Hydrograph #6 - Intragradient conditions were not consistently observed during the month. The average monthly water elevation for Well 3S (inside) and Well 4S (outside) was 1.34 and 1.40 feet msl, respectively. The monthly averages were within 0.2 feet, and therefore no dominant flow direction was evident for the month.

Vertical Gradient (3S/3RR)-Inside/Hydrograph #10 – Upward gradient conditions were not consistently maintained between the bedrock and overlying sand & gravel units inside the slurry wall. The average monthly water elevation for Well 3S (sand & gravel) and 3RR (bedrock) was 1.34 and 1.36 feet msl, respectively.

Vertical Gradient (4S/4R)-Outside/Hydrograph #11 – The vertical gradient between the bedrock and overlying sand & gravel units was in a downward direction throughout the month. The average monthly water elevation for Well 4S (sand & gravel) and 4R (bedrock) was 1.40 and 1.11 feet msl, respectively.

Transect 3

Refuse (5G/6G)/Hydrograph #3 – Intragradient conditions were maintained throughout the month.

Sand and Gravel (5S/6S)/Hydrograph #7 - Intragradient conditions were maintained throughout the month.

Vertical Gradient (5R/5S)-Inside/Hydrograph #12 – Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units inside the slurry wall throughout the month.

Vertical Gradient (6R/6S)-Outside/Hydrograph #13 – Upward gradient conditions were not observed between the bedrock and overlying sand & gravel units outside the slurry wall. The difference in average monthly water elevations for Well 6S (sand & gravel) and 6R (bedrock) did not indicate a dominant flow direction.

Transect 4

Refuse Oil Seeps Area (13G/15G)/Hydrograph #4 - Intragradient conditions were maintained throughout the month.

Sand and Gravel Oil Seeps Area (13S/15S)/Hydrograph #9 - Due to an upward gradient between the sand & gravel and refuse units in the oil seeps area, groundwater was not collected from the sand & gravel unit. Hydrograph #9 shows the ambient conditions between Wells W-15S (outside) and W-13S (inside) in the sand & gravel unit. Water levels from Well W-15G in the refuse unit are included on the hydrograph for comparison.

Sand and Gravel (7S/8S)/Hydrograph #8 - Intragradient conditions were maintained throughout the month.

Vertical Gradient (7R/7S)-Inside/Hydrograph #14 - Upward gradient conditions were maintaned between the bedrock and overlying sand & gravel units inside the slurry wall throughout the month.

Vertical Gradient (8RR/8S)-Outside/Hydrograph #15 - Upward gradient conditions were maintained between the bedrock and overlying sand & gravel units outside the slurry wall throughout the month.

Transect 5

Refuse (9G/10G)/Hydrograph #5 – Intragradient conditions were maintained throughout the month.

Figure 1 shows the hydraulic profile summary for June 2001.

Groundwater and Leachate Collection

Based on data provided by U.S. Filter, the following volumes of groundwater and leachate were extracted from the sand & gravel wells and leachate collection system for the period from June 1 to June 30, 2001:

S&G #1 Groundwater	S&G #2 Groundwater	S&G #3 Groundwater	S&G #4 Groundwater	Leachate
29,137 gal.	212,437 gal.	62,465 gal.	12,866 gal.	21,073 gal.
971 gpd	7,081 gpd	2,082 gpd	429 gpd	702 gpd

For the period, a total of 316,905 gallons of groundwater was collected. The recommended rates are 10,000 gpd and 5,000 gpd from S&G #2 and #3, respectively. The average daily groundwater extraction rate for all of the wells of 10,563 gpd was below the recommended extraction rate of 15,000 gpd. The extraction rates of 7,081 gpd from S&G #2, and 2,082 gpd from S&G #3 were below the recommended extraction rates for these wells.

Based on the hydrogeologic data recorded, an extraction rate of 7,081 gpd from S&G #2 is insufficient to impose intragradient conditions at Transect 2. In addition, the extraction rate was insufficient to impose an upward gradient between the bedrock and overlying sand & gravel unit within the slurry wall at Transect 2. The collection rate at S&G #2 should be increased to provide hydraulic containment in the vicinity of Transect 2.

The leachate extraction rate of 702 gpd was below the recommended rate of 1,200 gpd. However, intragradient conditions were maintained in the refuse unit at all of the transect locations throughout the month. Based on the June hydraulic data, it appears that a leachate collection rate below the current recommended rate of 1,200 gpd is sufficient to maintain hydraulic containment in the refuse unit. Therefore, we recommend a reduction in the proposed leachate collection rate to 1,000 gpd. Please note that the new recommended leachate collection rate of 1,000 gpd is higher than the average collection rate for June of 702 gpd.

CONCLUSIONS

- Intragradient conditions were maintained in the refuse unit at all of the transect locations throughout the month.
- Intragradient conditions were maintained in the sand & gravel unit at Transects 3 and 4. Intragradient conditions were not observed in the sand & gravel unit at Transect 2.
- Inside the slurry wall, upward gradient conditions were observed between the bedrock and overlying sand & gravel unit at Transects 3 and 4. Upward gradient conditions were not observed at Transect 2.

RECOMMENDATIONS

- Leachate collection rates should be increase and maintained at 1,000 gpd.
- The sand & gravel extraction rate for the site should be increased to 15,000 gpd from the June average of 10,563 gpd.
- The collection rate for S&G #2 should be increased from 7,081 gpd to the recommended rate of 10,000 gpd.
- The collection rate for S&G #3 should be increased to 5,000 gpd from the June average of 2,082 gpd.

We trust you find this information useful. If you have any questions, please do not hesitate to contact us.

Sincerely,

IT Corporation

Steven Goldberg, Ph.D, CPG
Senior Hydrogeologist

Thomas Connors, P.E.
Project Manager

Attachments

cc: Glenn Grieb, US Filter

Table 1
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Period	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Period	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-1G	April	11.09	11.23	11.17	W-2G	April	12.94	14.61	13.70
	May	11.09	11.22	11.19		May	11.88	13.09	12.75
	June	11.09	12.82	12.25		June	12.95	13.70	13.28
	2nd Quarter	11.09	12.82	11.52		2nd Quarter	11.88	14.61	13.22
W-3G	April	10.23	10.97	10.71	W-4G	April	11.07	11.71	11.42
	May	10.29	10.92	10.65		May	10.79	11.28	11.04
	June	10.44	10.93	10.64		June	10.99	11.40	11.18
	2nd Quarter	10.23	10.97	10.67		2nd Quarter	10.79	11.71	11.24
W-3S	April	-0.13	2.44	1.40	W-4S	April	-0.03	2.87	1.39
	May	-0.34	1.95	0.87		May	0.28	2.37	1.26
	June	0.36	2.22	1.34		June	0.20	2.85	1.40
	2nd Quarter	-0.34	2.44	1.20		2nd Quarter	-0.03	2.87	1.35
W-5G	April	10.23	11.16	10.69	W-6G	April	12.84	13.93	13.37
	May	10.27	11.12	10.69		May	12.56	13.48	13.00
	June	10.48	11.14	10.74		June	12.79	13.52	13.21
	2nd Quarter	10.23	11.16	10.71		2nd Quarter	12.56	13.93	13.21
W-5S	April	0.97	2.33	1.65	W-6S	April	1.29	2.65	1.97
	May	0.97	1.94	1.45		May	1.36	2.26	1.79
	June	1.03	2.16	1.56		June	1.40	2.44	1.88
	2nd Quarter	0.97	2.33	1.96		2nd Quarter	1.29	2.65	1.88
W-7S	April	1.58	2.79	2.16	W-8S	April	1.84	4.17	2.52
	May	1.44	2.36	1.93		May	1.91	4.08	2.46
	June	1.36	2.51	1.81		June	1.86	4.12	2.48
	2nd Quarter	1.44	2.79	1.96		2nd Quarter	1.84	4.17	2.49
W-15S	April	2.00	3.28	2.50	W-13S	April	1.85	3.47	2.40
	May	1.99	2.99	2.39		May	1.87	3.20	2.30
	June	2.05	3.09	2.44		June	1.86	3.24	2.32
	2nd Quarter	1.99	3.28	2.44		2nd Quarter	1.85	3.47	2.34
W-15G	April	0.35	0.55	0.46	W-13G	April	6.32	7.07	6.76
	May	0.39	0.55	0.48		May	6.20	6.93	6.62
	June	0.43	0.55	0.48		June	6.43	7.06	6.71
	2nd Quarter	0.35	0.55	0.47		2nd Quarter	6.20	7.07	6.69
W-9G	April	7.16	7.94	7.51	W-10G	April	8.30	8.54	8.41
	May	7.12	7.77	7.45		May	8.19	8.33	8.24
	June	7.32	8.10	7.70		June	8.32	8.66	8.48
	2nd Quarter	7.12	8.10	7.56		2nd Quarter	8.19	8.66	8.38

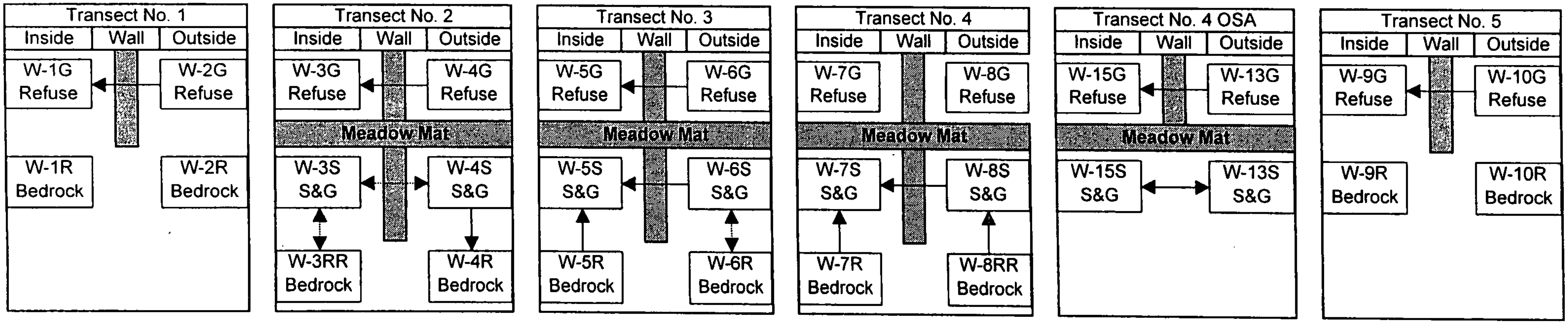
Table 1
KinBuc Landfill Operable Units 1 and 2
Continuous Hydraulic Monitoring Results
2001 Minimum/Maximum Water Elevations

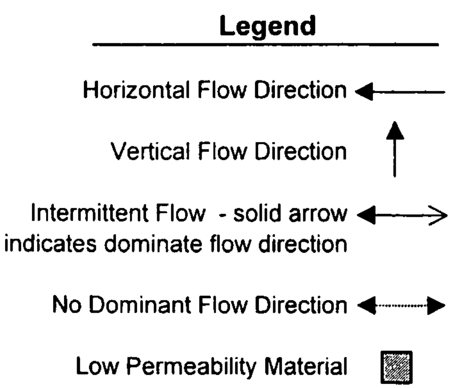
Inside Slurry Wall					Outside Slurry Wall				
Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion	Well ID	Monitoring Month	Minimum Recorded Water Elevation	Maximum Recorded Water Elevation	Average Water Elevaion
W-3RR	April	-0.33	2.79	1.40	W-4R	April	-0.52	2.69	1.09
	May	-0.27	2.22	0.98		May	-0.21	2.20	0.92
	June	0.18	2.52	1.36		June	-0.25	2.65	1.11
	2nd Quarter	-0.33	2.79	1.25		2nd Quarter	-0.52	2.69	1.04
W-5R	April	1.18	2.57	1.88	W-6R	April	1.29	2.63	1.96
	May	1.06	2.16	1.63		May	1.35	2.24	1.78
	June	1.17	2.39	1.76		June	1.39	2.42	1.87
	2nd Quarter	1.06	2.57	1.75		2nd Quarter	1.29	2.63	1.87
W-7R	April	1.69	2.86	2.24	W-8RR	April	2.02	4.36	2.70
	May	1.55	2.45	2.03		May	2.07	4.24	2.63
	June	1.79	2.66	2.17		June	2.02	4.30	2.64
	2nd Quarter	1.55	2.86	2.14		2nd Quarter	2.02	4.36	2.66

Table 2
Kin-Buc Landfill
Leachate Cleanout Monitoring
2001

Cleanout location	14N		14E		15N		15E		16N		16E	
Elevation @ Sea Level	22.87		22.77		26.51		26.51		31.36		31.32	
	depth to water	elevation	depth to water	elevation	depth to water	elevation	depth to water	elevation	depth to water	elevation	depth to water	elevation
Elevation Average		10.80		10.74		10.66		10.67				11.11
DATE												
7/5/01	11.92	10.95	11.84	10.93	15.75	10.76	15.75	10.76	dry	na	dry	na
6/7/01	11.98	10.89	12.02	10.75	15.86	10.65	15.87	10.64	dry	na	dry	na
5/16/01	12.25	10.62	12.23	10.54	15.96	10.55	15.96	10.55	dry	na	dry	na
4/26/01	12.36	10.51	12.35	10.42	15.99	10.52	16.01	10.50	dry	na	dry	na
3/21/01	11.80	11.07	11.75	11.02	15.62	10.89	15.59	10.92	dry	na	dry	na
2/26/01	12.03	10.84	11.94	10.83	15.95	10.56	15.92	10.59	dry	na	dry	na
1/29/01	12.08	10.79	11.98	10.79	15.85	10.66	15.83	10.68	dry	na	20.41	10.91
12/27/01	12.02	10.85	11.94	10.83	15.72	10.79	15.68	10.83	dry	na	20.01	11.31

Figure 1
Kin-Buc Landfill
Hydraulic Profile Summary
June 2001





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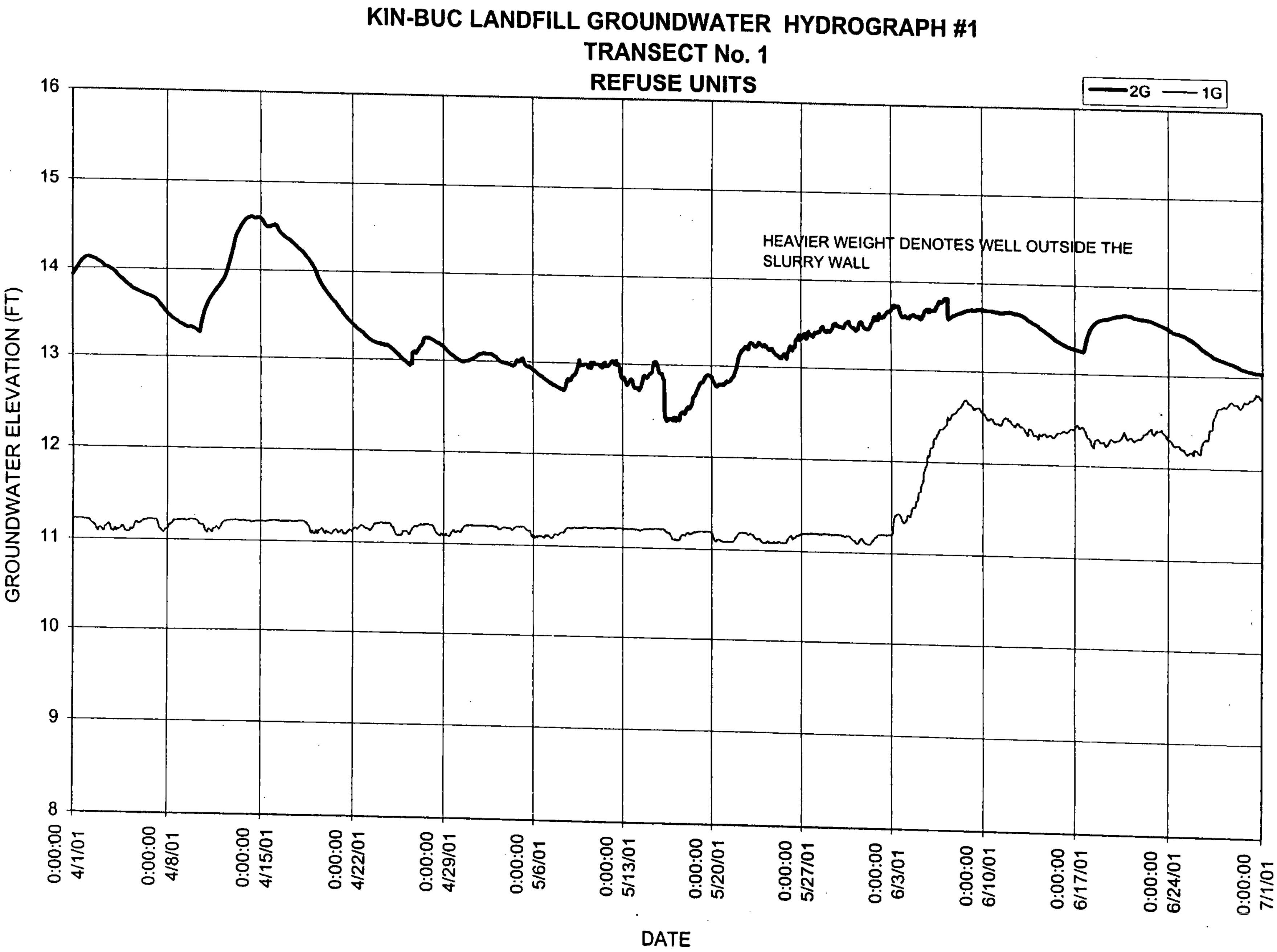

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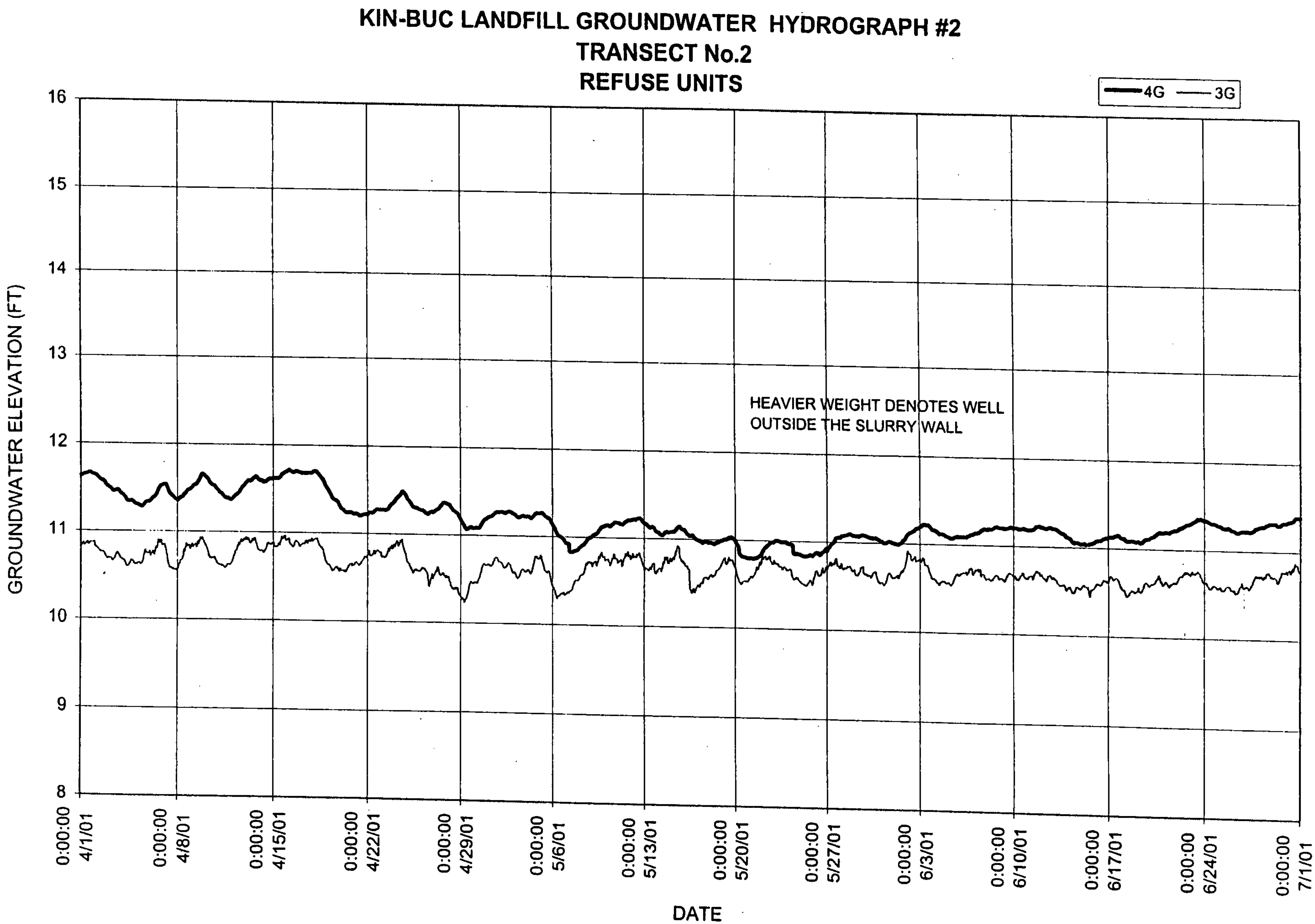
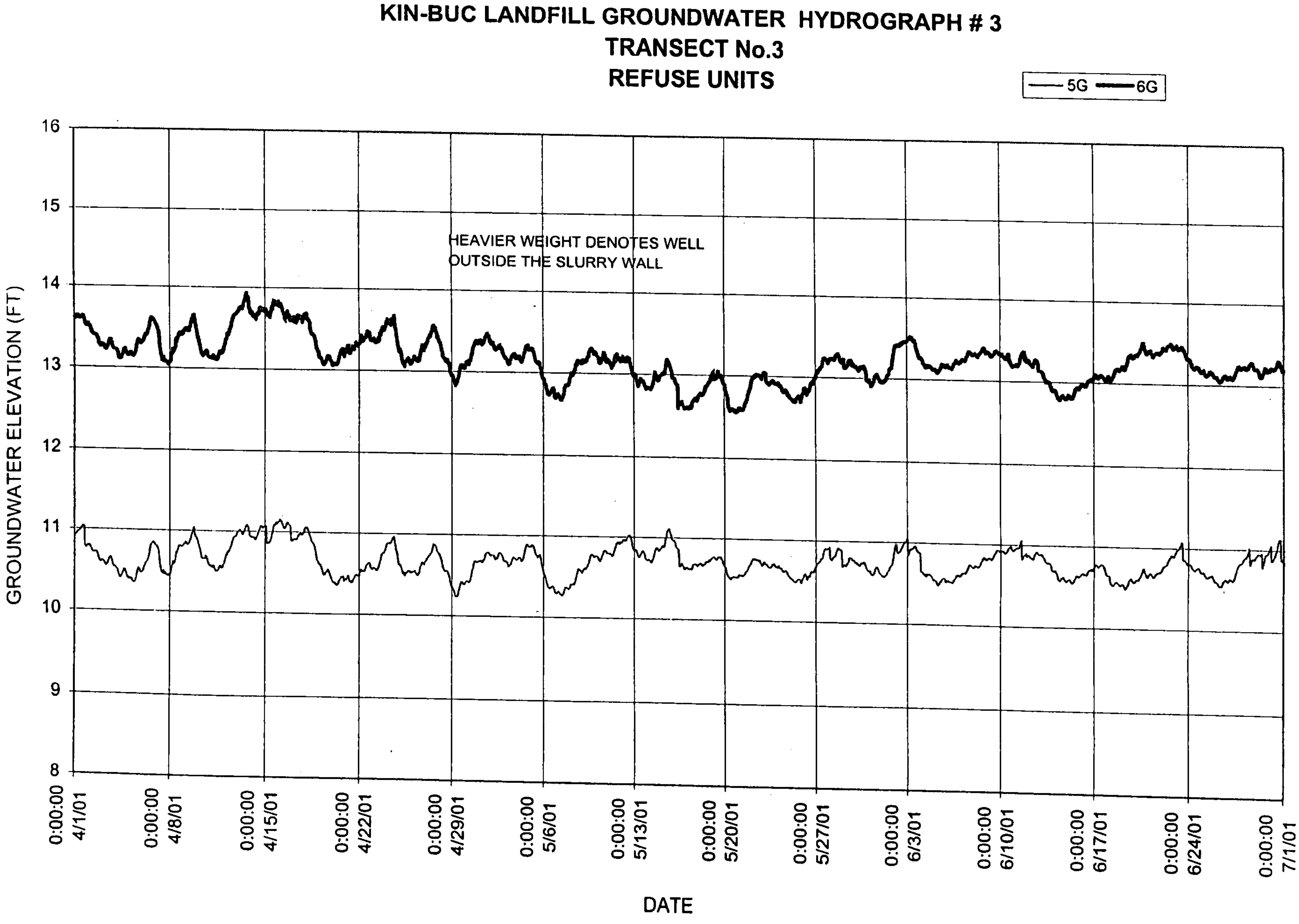

KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #2
TRANSECT No.2
REFUSE UNITS
4G
3G
GROUNDWATER ELEVATION (FT)
16
15
14
13
12
11
10
9
8
HEAVIER WEIGHT DENOTES WELL OUTSIDE THE SLURRY WALL
4/1/01 0:00:00
4/8/01 0:00:00
4/15/01 0:00:00
4/22/01 0:00:00
4/29/01 0:00:00
5/6/01 0:00:00
5/13/01 0:00:00
5/20/01 0:00:00
5/27/01 0:00:00
6/3/01 0:00:00
6/10/01 0:00:00
6/17/01 0:00:00
6/24/01 0:00:00
7/1/01 0:00:00
DATE



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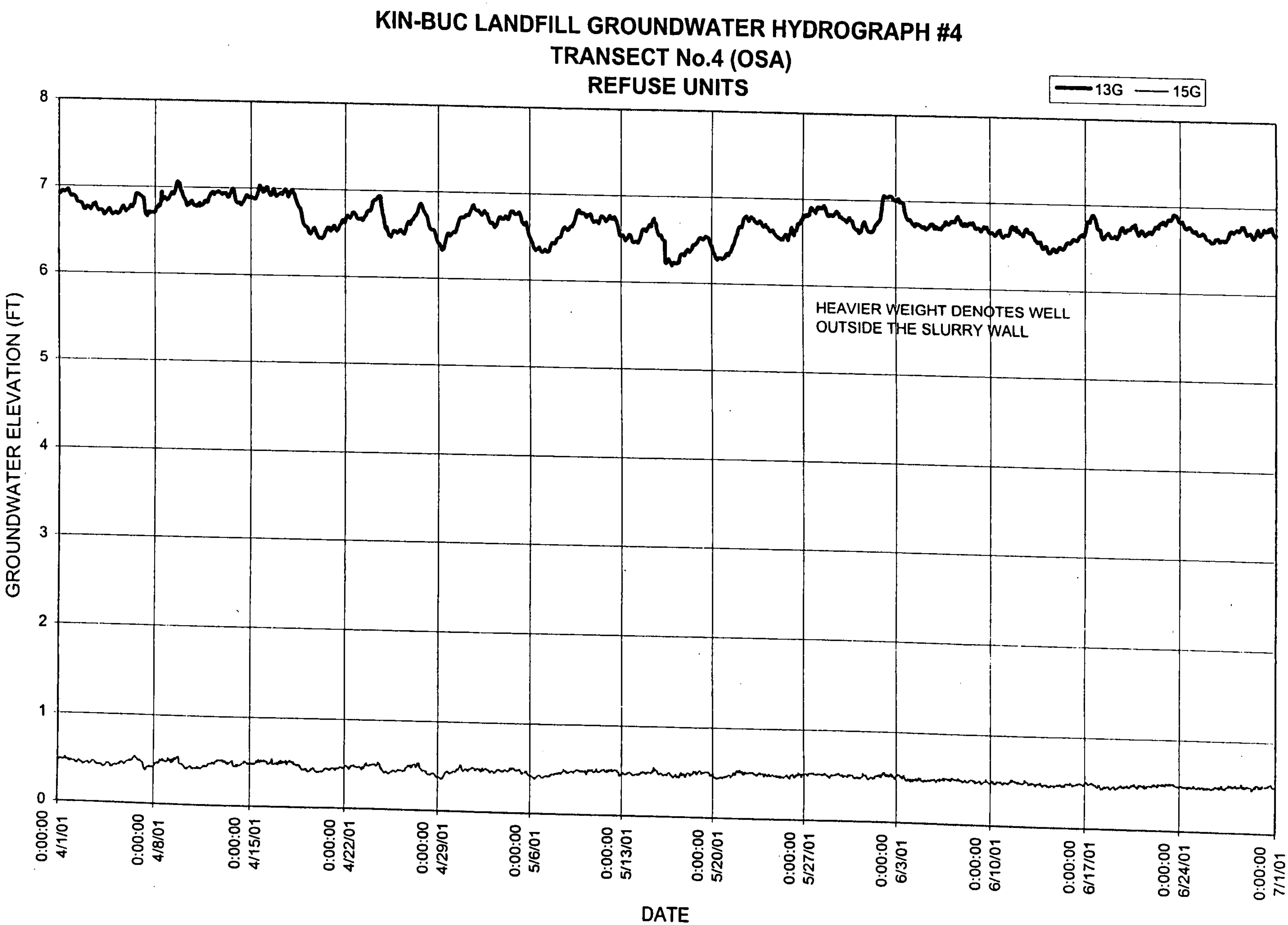
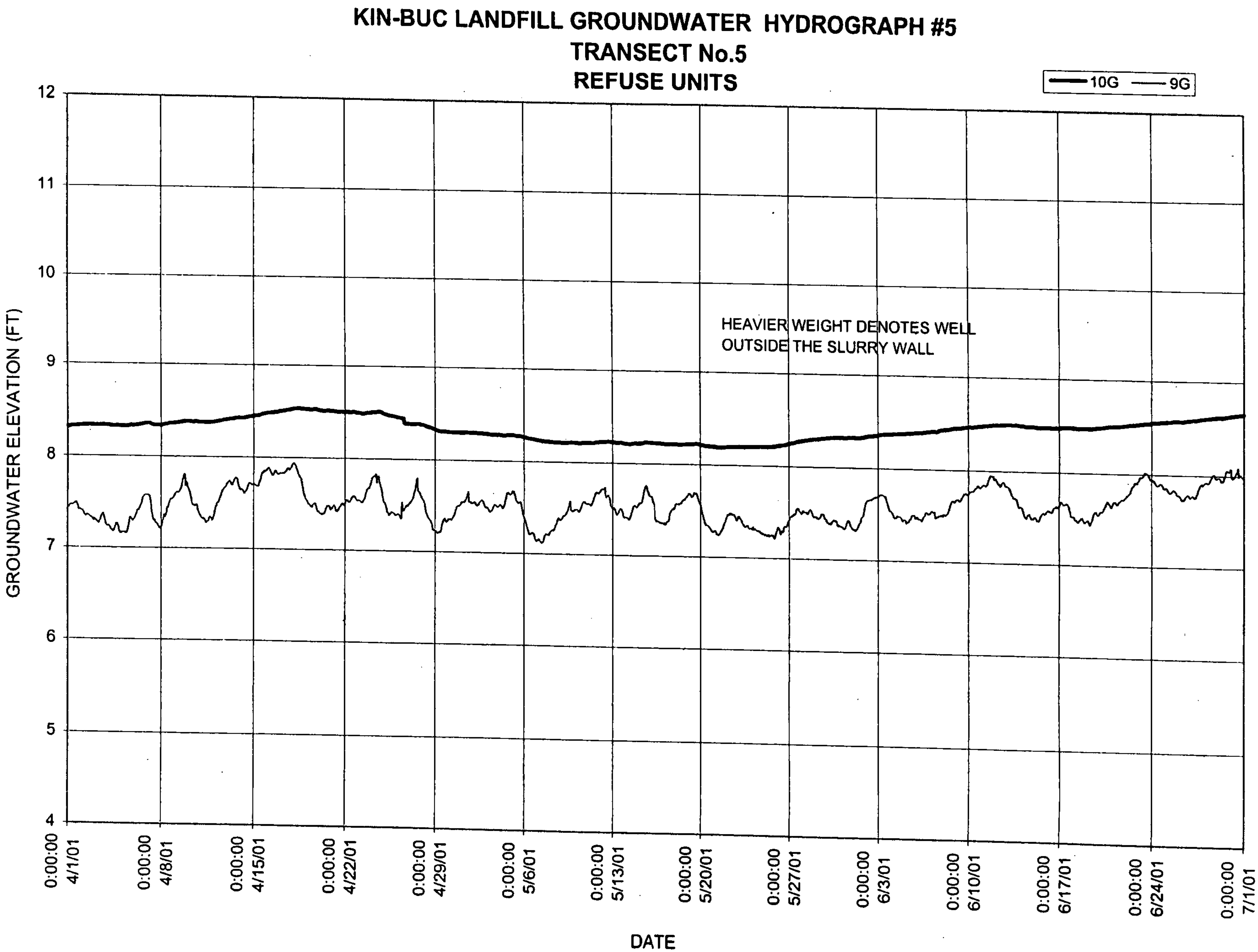


KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #4
TRANSECT No.4 (OSA)
REFUSE UNITS
13G
15G
HEAVIER WEIGHT DENOTES WELL OUTSIDE THE SLURRY WALL
GROUNDWATER ELEVATION (FT)
8
7
6
5
4
3
2
1
0
0:00:00 4/1/01
0:00:00 4/8/01
0:00:00 4/15/01
0:00:00 4/22/01
0:00:00 4/29/01
0:00:00 5/6/01
0:00:00 5/13/01
0:00:00 5/20/01
0:00:00 5/27/01
0:00:00 6/3/01
0:00:00 6/10/01
0:00:00 6/17/01
0:00:00 6/24/01
0:00:00 7/1/01
DATE



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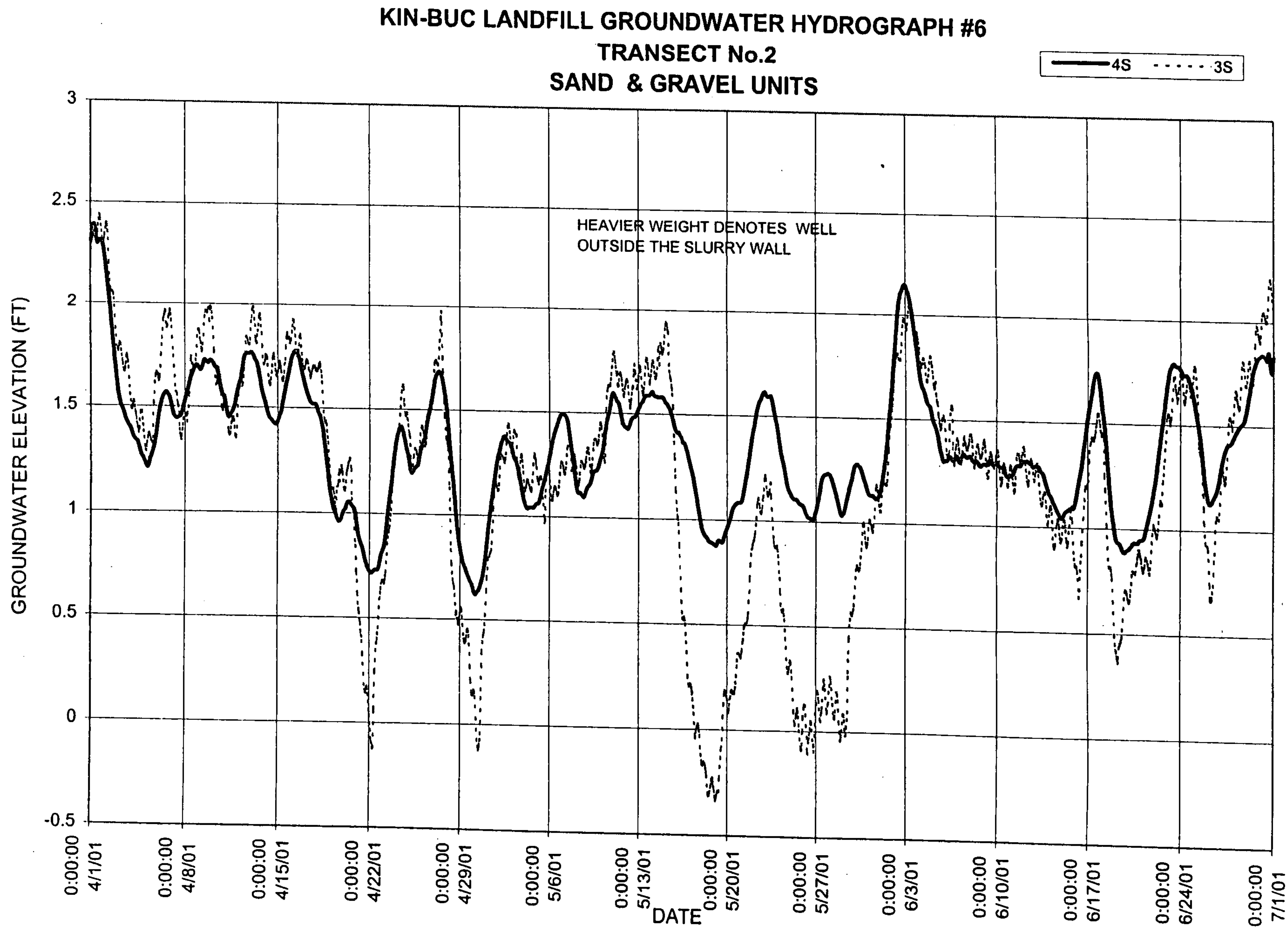

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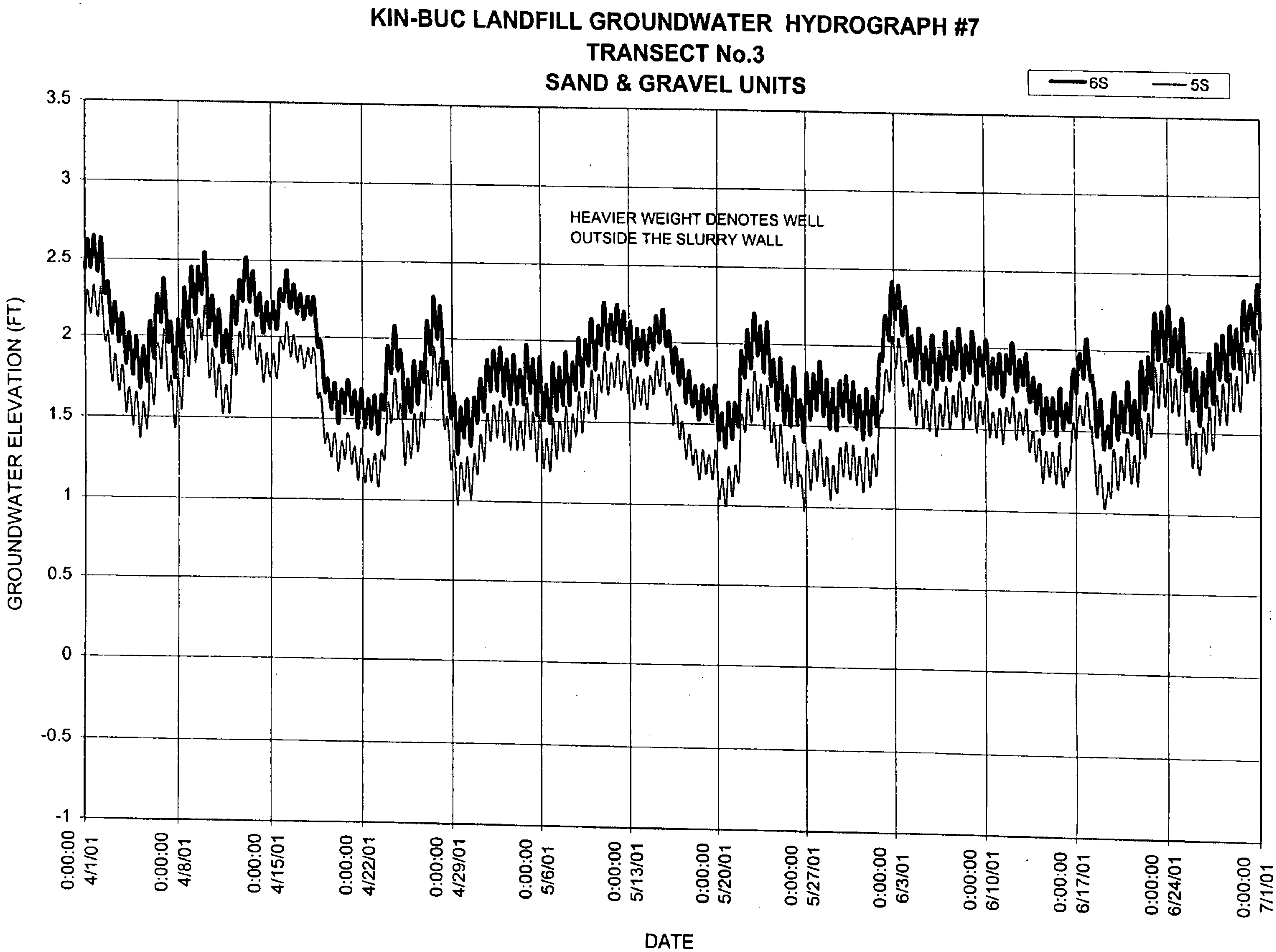

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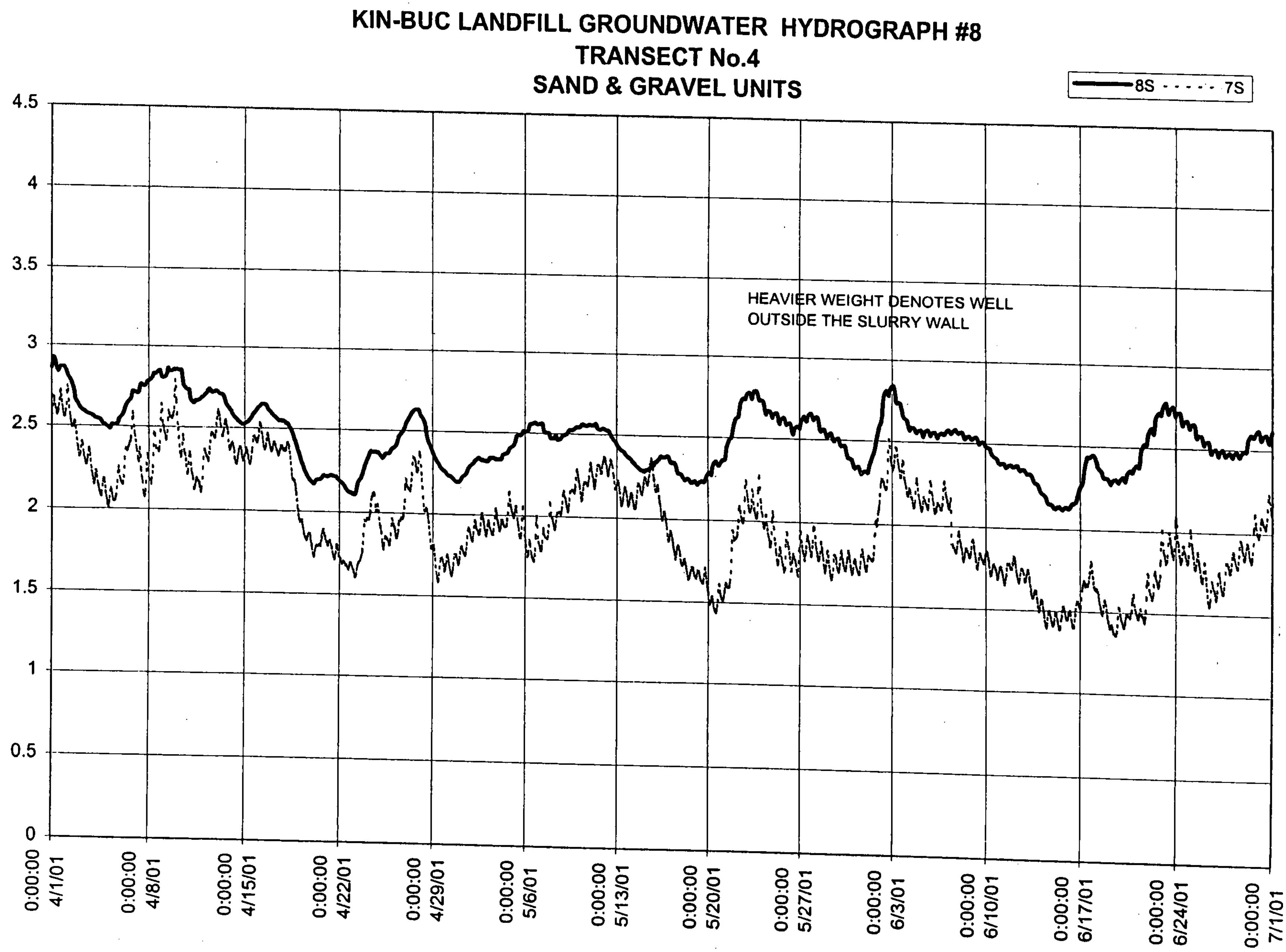
KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #8
TRANSECT No.4
SAND & GRAVEL UNITS
8S
7S
HEAVIER WEIGHT DENOTES WELL
OUTSIDE THE SLURRY WALL
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0:00:00 4/1/01
0:00:00 4/8/01
0:00:00 4/15/01
0:00:00 4/22/01
0:00:00 4/29/01
0:00:00 5/6/01
0:00:00 5/13/01
0:00:00 5/20/01
0:00:00 5/27/01
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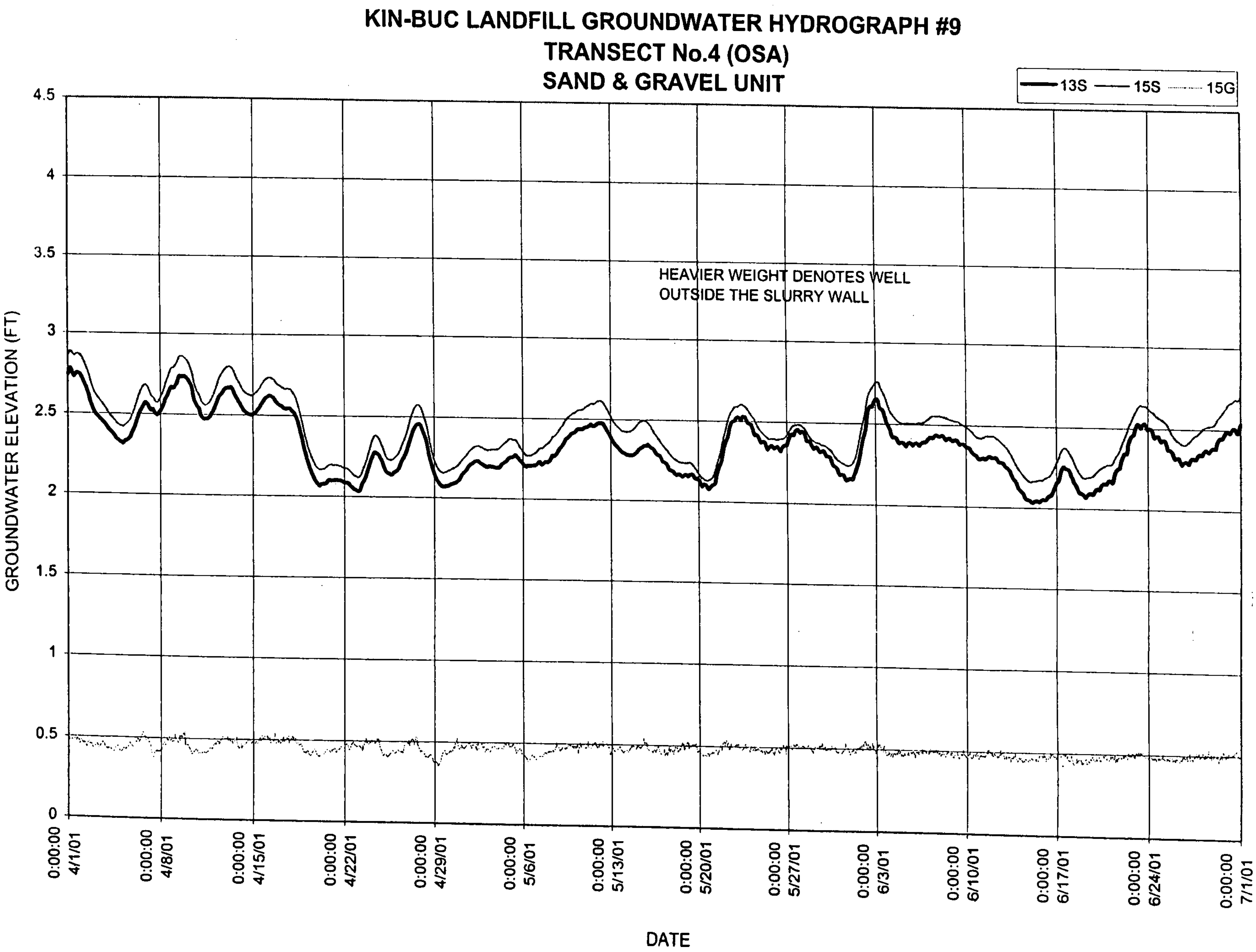
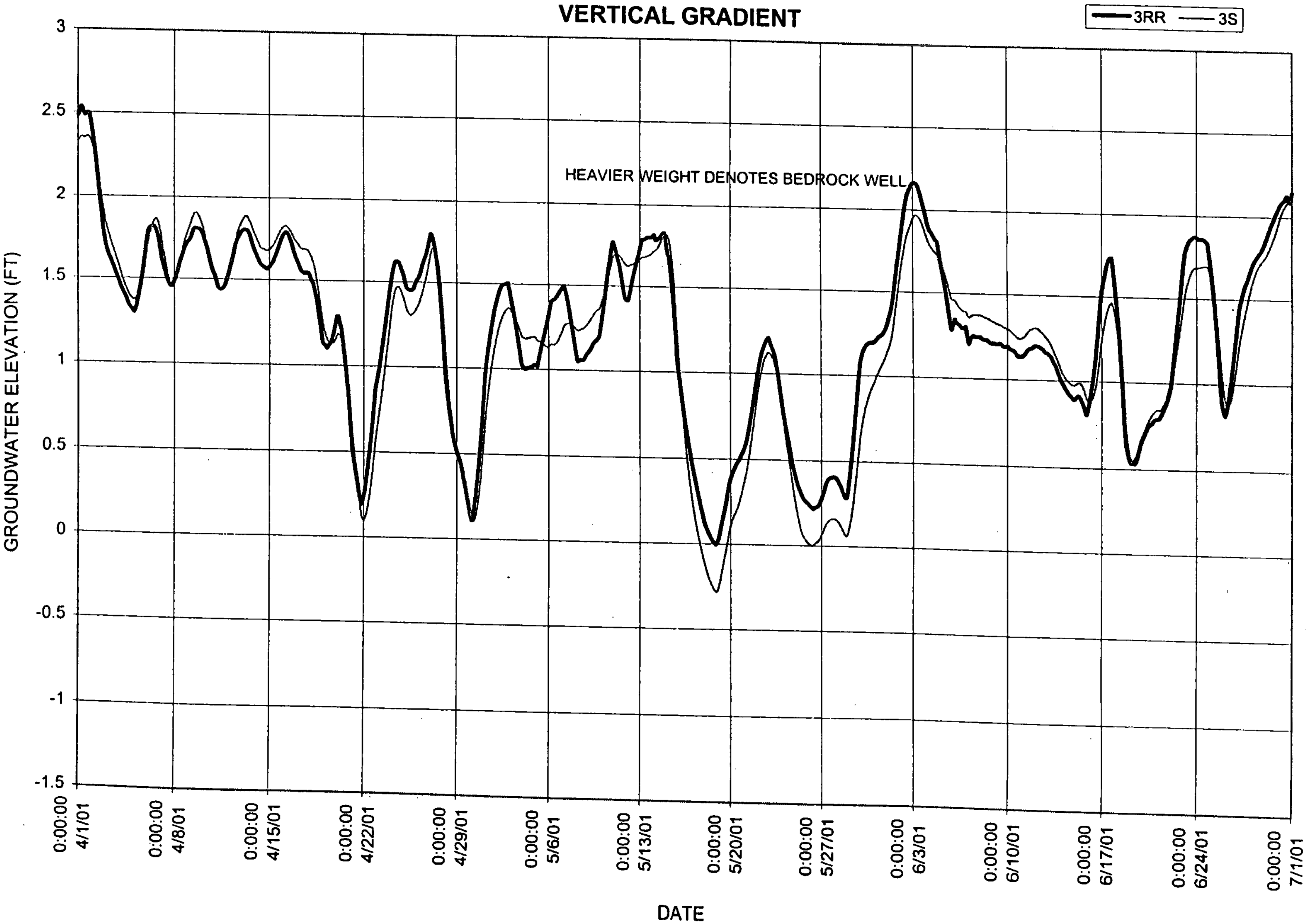
0:00:00 6/17/01
0:00:00 6/24/01
0:00:00 7/1/01



KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #9
TRANSECT No.4 (OSA)
SAND & GRAVEL UNIT
13S
15S
15G
HEAVIER WEIGHT DENOTES WELL OUTSIDE THE SLURRY WALL
GROUNDWATER ELEVATION (FT)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0:00:00 4/1/01
0:00:00 4/8/01
0:00:00 4/15/01
0:00:00 4/22/01
0:00:00 4/29/01
0:00:00 5/6/01
0:00:00 5/13/01
0:00:00 5/20/01
0:00:00 5/27/01
0:00:00 6/3/01
0:00:00 6/10/01
0:00:00 6/17/01
0:00:00 6/24/01
0:00:00 7/1/01
DATE

KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #10
TRANSECT No.2 - INSIDE
VERTICAL GRADIENT



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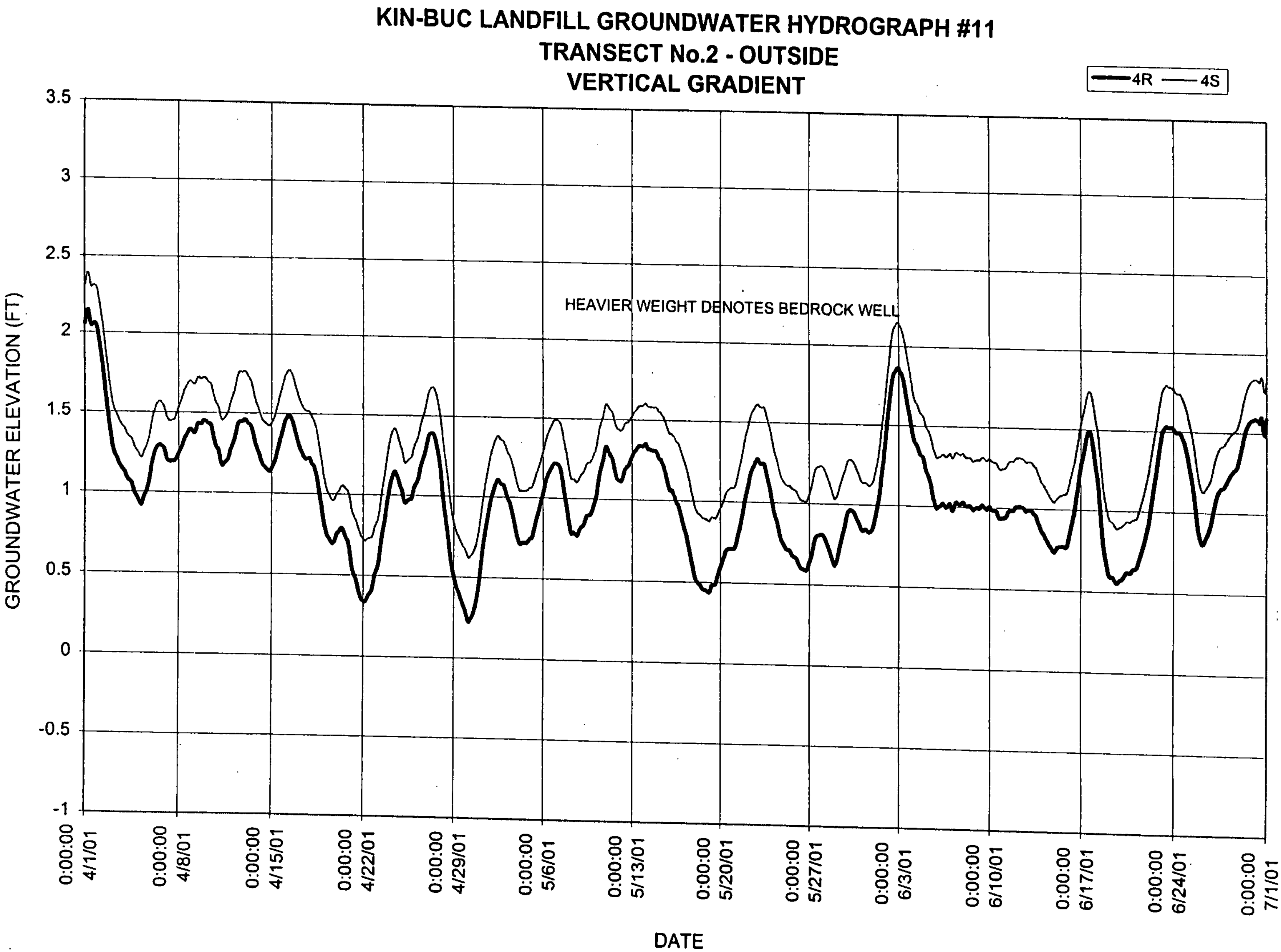
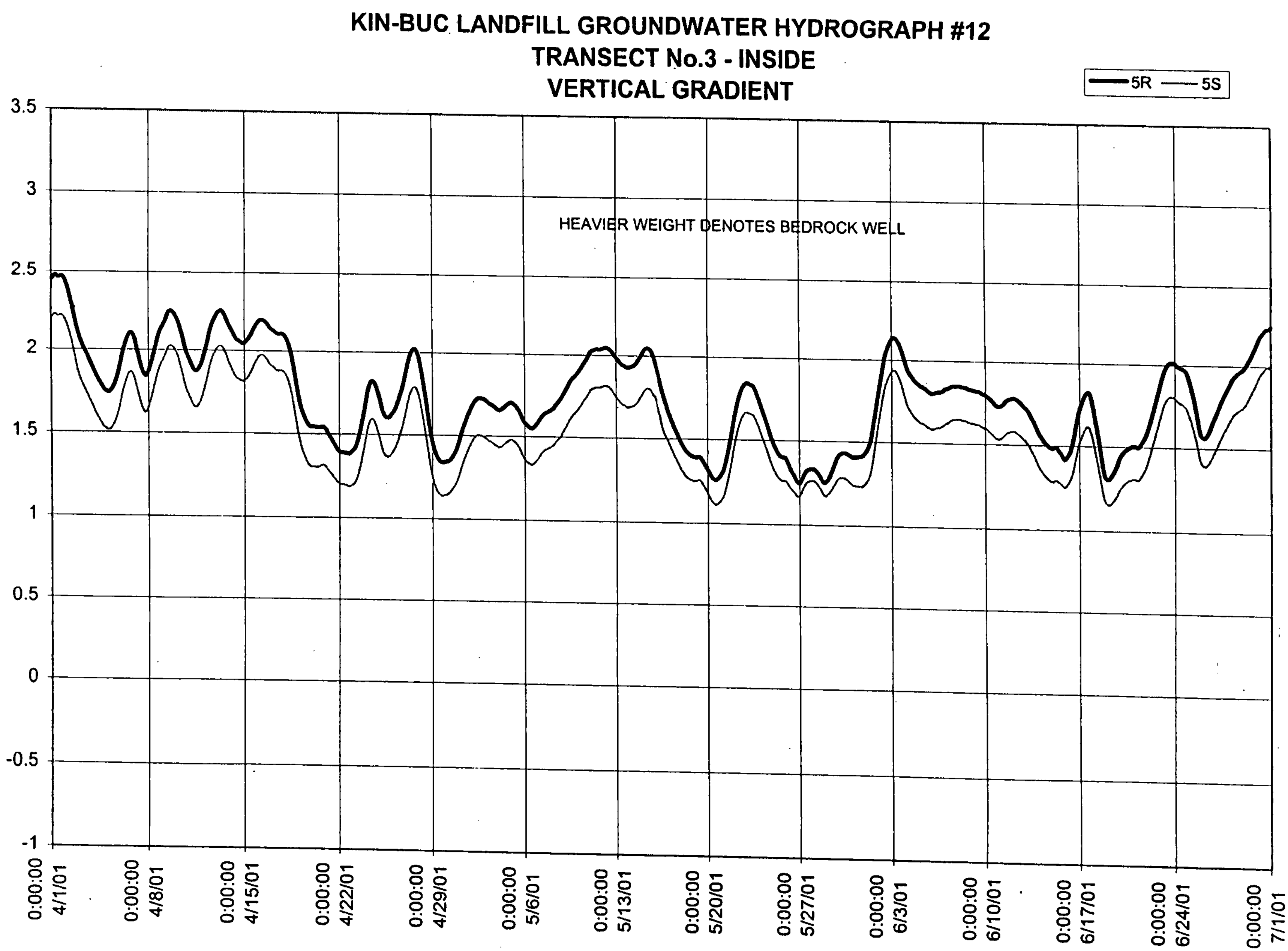
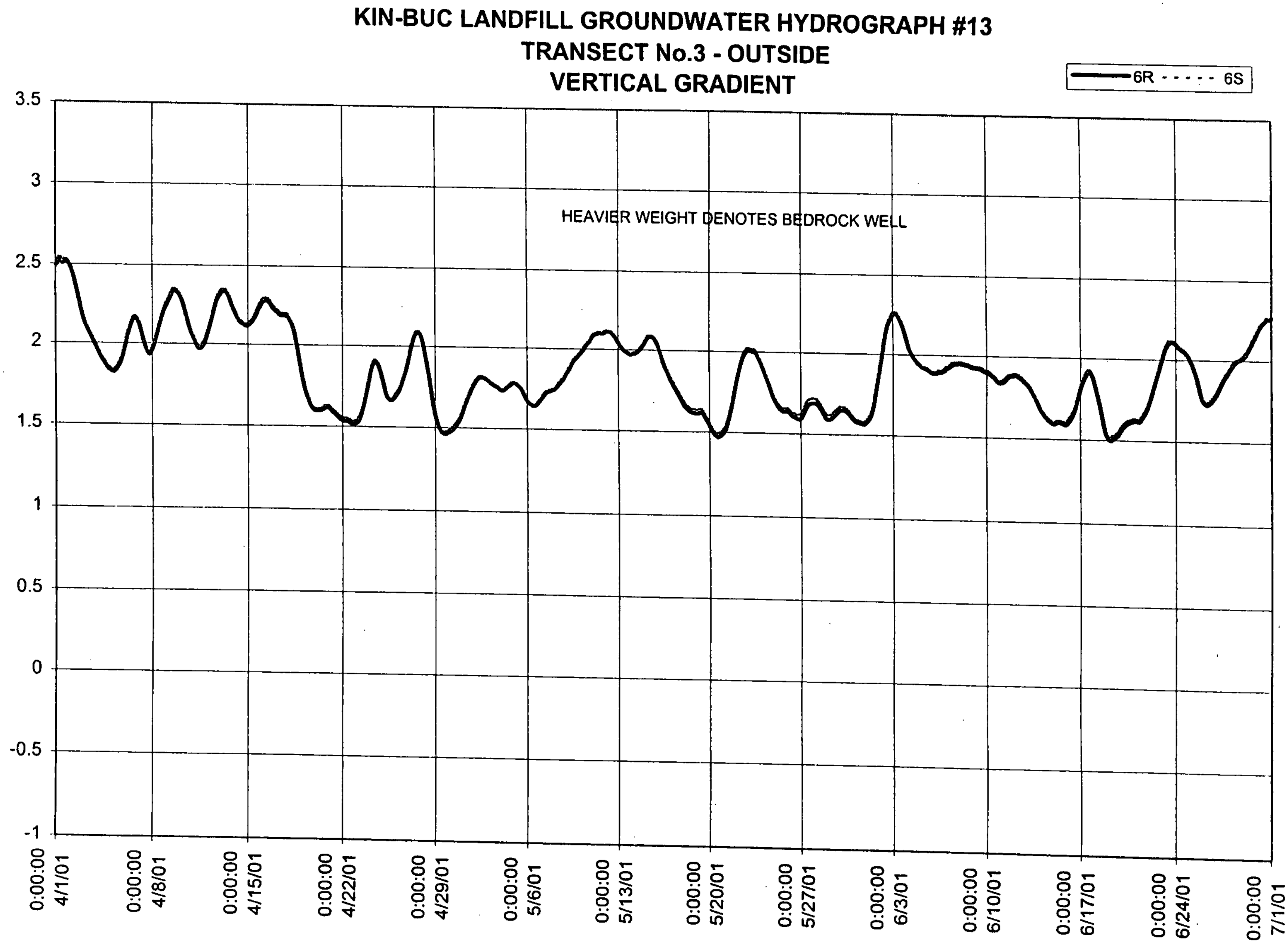
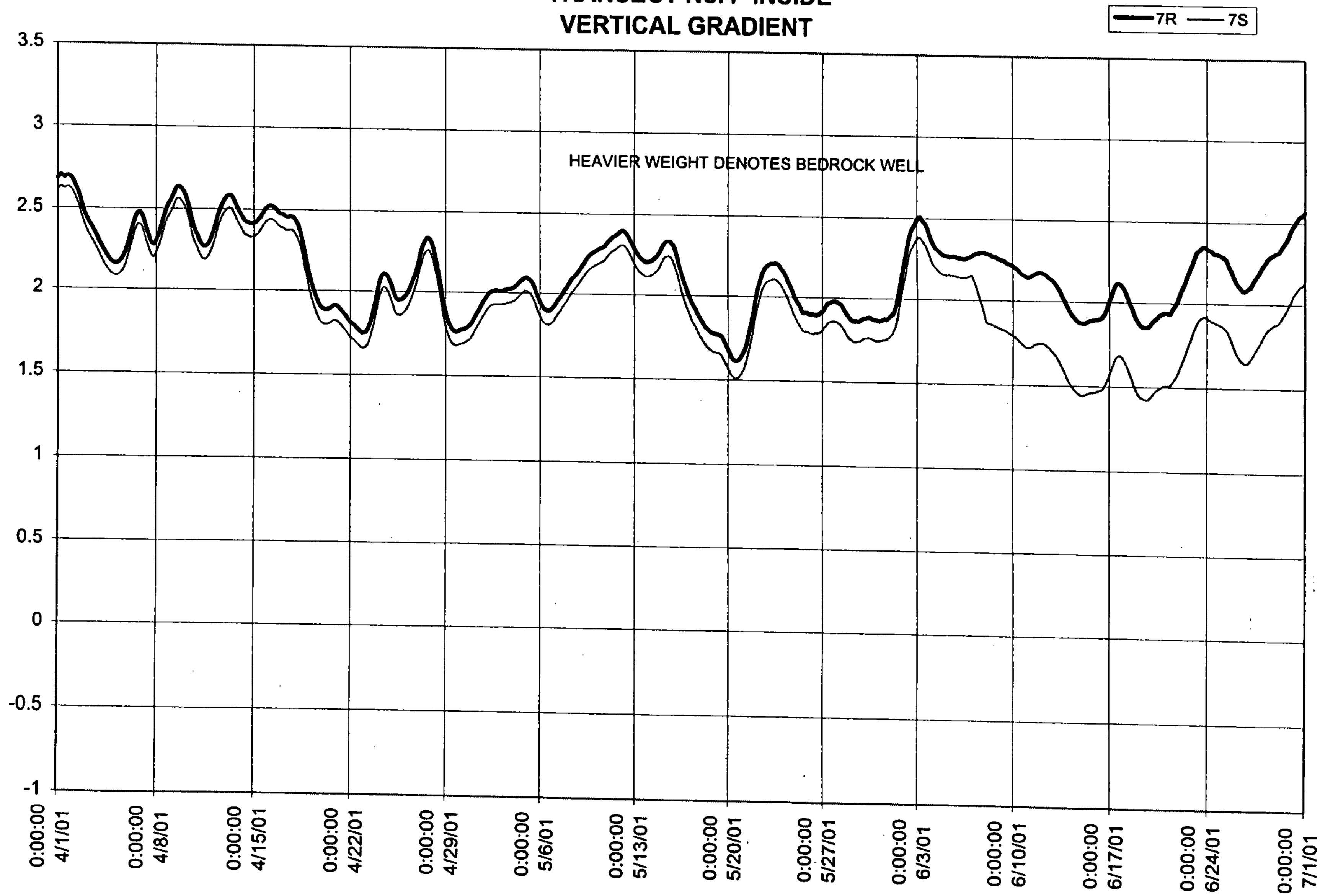

KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #11
TRANSECT No.2 - OUTSIDE
VERTICAL GRADIENT
4R
4S
HEAVIER WEIGHT DENOTES BEDROCK WELL
GROUNDWATER ELEVATION (FT)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0:00:00 4/1/01
0:00:00 4/8/01
0:00:00 4/15/01
0:00:00 4/22/01
0:00:00 4/29/01
0:00:00 5/6/01
0:00:00 5/13/01
0:00:00 5/20/01
0:00:00 5/27/01
0:00:00 6/3/01
0:00:00 6/10/01
0:00:00 6/17/01
0:00:00 6/24/01
0:00:00 7/1/01
DATE


KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #12
TRANSECT No.3 - INSIDE
VERTICAL GRADIENT
5R
5S
HEAVIER WEIGHT DENOTES BEDROCK WELL
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0:00:00 4/1/01
0:00:00 4/8/01
0:00:00 4/15/01
0:00:00 4/22/01
0:00:00 4/29/01
0:00:00 5/6/01
0:00:00 5/13/01
0:00:00 5/20/01
0:00:00 5/27/01
0:00:00 6/3/01
0:00:00 6/10/01
0:00:00 6/17/01
0:00:00 6/24/01
0:00:00 7/1/01



n://proj/kinbuc/15023500.000/1stqt01/trans3/6...

KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #14
TRANSECT No.4- INSIDE
VERTICAL GRADIENT



n://proj/kinbuc/15023500.000/1stqt01/trans4/7r-7s

KIN-BUC LANDFILL GROUNDWATER HYDROGRAPH #15
TRANSECT No.4- OUTSIDE
VERTICAL GRADIENT